MAULES CREEK COAL MINE

2023 ANNUAL REVIEW

WHITEHAVEN COAL

Table 1: Annual Review Title Block

Name of Operation	Maules Creek Coal Mine
Name of Operator	Maules Creek Coal Pty Ltd
Development consent / Project Approval #	Project Approval 10_0138
Name of holder of development consent/project approval	Aston Coal 2 Pty Ltd.
Mining lease #	CL 375, ML1719 and ML1701.
Name of holder of mining lease	Maules Creek Coal JV which comprises: Aston Coal 2 Pty Ltd (75%), ICRA MC Pty Ltd (15%), J Power Australia Pty Ltd (10%)
Water Licence #	Refer to Water Licences in Table 2
Name of holder of water licence	Aston Coal 2 Pty Ltd, ICRA MC Pty Ltd, J Power Australia Pty Ltd
FWP start date	January 2023
FWP end date	December 2025
Annual Review Commencement Date	1 January 2023
Annual Review Completion Date	31 December 2023

I, Jorge Moraga, certify that this audit report is a true and accurate record of the compliance status of Maules Creek Coal Mine for the period 1 January 2023 to 31 December 2023, and that I am authorised to make this statement on behalf of Maules Creek Coal Pty Ltd.

Note.

a) The Annual Review is an 'environmental audit' for the purposes of section 122B (2) of the Environmental Planning and Assessment Act 1979. Section 122E provides that a person must not include false or misleading information (or provide information for inclusion in) an audit report produced to the Minister in connection with an environmental audit if the person knows that the information is false or misleading in a material respect. The maximum penalty is, in the case of a corporation, $1 million and for an individual, $250,000.

b) The Crimes Act 1900 contains other offences relating to false and misleading information: section 192G (Intention to defraud by false or misleading statement—maximum penalty 5 years imprisonment); sections 307A, 307B and 307C (False or misleading applications/information/documents—maximum penalty 2 years imprisonment or $22,000, or both).

Name of Authorised Reporting Officer	Jorge Moraga
Title of Authorised Reporting Officer	General Manager

21/03/2024

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1 STATEMENT OF COMPLIANCE

This Annual Review has been prepared to provide a summary of the environmental performance of the Maules Creek Coal Mine over the reporting period. The compliance status of the MCCM was assessed against the Environment Protection Licence (No.20221) (EPL), and where required against the Project Approval, specifically Schedule 3, conditions 26, 30, 33 (c), 38 (b) and 40 (b).

Table 2: Statement of Compliance

Were all the conditions of the relevant approvals complied with?	Yes/No
Project Approval PA 10_0138	No
Coal Lease CL 375	Yes
Forward Plan	Yes
Mining Lease ML 1701	Yes
Mining Lease ML 1719	Yes
Exploration Licence A 346	Yes
Environment Protection Licence (No. 20221) (applicable conditions as above)	Yes
90WA801901 DWE Ref no: 90AL801900	Yes
Groundwater Monitoring Bores: 90BL255779, 90BL255780, 90BL255781, 90BL255782, 90BL255783, 90BL255784, 90BL255785, 90BL255786, 90BL255787, 90BL255788, 90WA822412, 90BL255789 and 90BL255790.	Yes
WAL12811	Yes
WAL12791	Yes
WAL29467	Yes
WAL29588	Yes
WAL27385	Yes
WAL12479	Yes
WAL27383	Yes
WAL13050	Yes
WAL41585	Yes
WAL36641	Yes
WAL12491	Yes
WAL12480	Yes
WAL12645	Yes
WAL12718	Yes
WAL12722	Yes

Any non-compliances during the reporting period are detailed in Table 4 and ranked according to the compliance status key presented in Table 3. Section 1.1 provides further details of any non-compliance and actions undertaken or proposed for the following reporting period to prevent re-occurrence and mitigate any potential adverse effects.

Table 3: Compliance Status Key

Risk Level	Colour Code	Description
High	Non–compliant	Non-compliance with potential for significant environmental consequences, regardless of the likelihood of occurrence
Medium	Non–compliant	Non-compliance with: • potential for serious environmental consequences, but is unlikely to occur; or • potential for moderate environmental consequences, but is likely to occur
Low	Non–compliant	Non-compliance with: • potential for moderate environmental consequences, but is unlikely to occur; or • potential for low environmental consequences, but is likely to occur
Administrative non-compliance	Non–compliant	Only to be applied where the non-compliance does not result in any risk of environmental harm (e.g. submitting a report to government later than required under approval conditions)

Table 4: Non-Compliances

Relevant Documentation	Condition. #	Condition Description (Summary)	Compliance Status	Comment	Where addressed in Annual Review
PA10_0138	Schedule 3 Condition 12 a)	Ensure all equipment and noise control measures deliver sound power levels that are equal to or better than the MCC EA	Non-compliant	Technical non-compliance of one individual fixed plant item. This is a result of in-service testing, the layout and operation of the CHPP which increases background noise levels and reduces the available measurement positions used in the assessment. Overall site sound power level was compliant.	Section 6.4.2

2 INTRODUCTION

This is the eleventh Annual Review produced for the Maules Creek Coal Mine (MCCM) and has been prepared in accordance with the NSW Department of Planning, Housing and Infrastructure's (DPHI) Integrated Mining Policy – Annual Review Guideline, October 2015, to satisfy the following requirements:

- the Annual Review requirements of the DPHI under the Project Approval PA 10_0138 (Condition 4 Schedule 5);
- the routine reporting expectations of DCCEEW (NSW).

Though primarily covering the period from 1 January 2023 to 31 December 2023 (the reporting period), where relevant the Annual Review provides information on historical aspects of the Maules Creek Coal Mine. Such as long term trends of environmental monitoring results and provides relevant information on activities to be undertaken in the ensuing reporting periods.

2.1 Project Background and Description

The Maules Creek Coal Mine is located on the north-west slopes and plains of New South Wales (NSW), approximately 18 kilometres (km) North-East of Boggabri within the Narrabri Local Government Area (LGA). The MCCM's regional locality is illustrated in Figure 1.

An Environmental Assessment for the Maules Creek Coal Project (referred to herein as the EA) was prepared by Hansen Bailey (2011) and was assessed under the NSW Environmental Planning and Assessment Act, 1979 (EP&A Act). The NSW Planning Assessment Commission (PAC), as a delegate for the NSW Minister for Planning and Infrastructure, issued the State Environmental Approval for the MCCM on 23 October 2012 (i.e. Project Approval PA 10_0138) for the construction and operation of an open cut coal mine with an approved maximum ROM coal production rate of 13 Mtpa until the end of December 2034. MCCM covers three mining leases CL 375, ML 1701 and ML1719. The Project Boundary (as defined by PA 10_0138) and mining authorities are shown on Figure 1 and Biodiversity Offset areas on Figure 2. The MCCM Commonwealth environmental approval (i.e. EPBC 2010/5566) was granted on 11 February 2013 by the Commonwealth Minister for Sustainability, Environment, Water, Population and Communities.

The operations phase of the MCCM commenced in June 2014, and coal was first transported from the MCCM via the rail spur in December of 2014.

A modification to PA 10_0138 was lodged and approved in 2013 to allow minor adjustments to the alignment of the CHPP infrastructure and the construction and operation of electrical infrastructure.

A second modification to PA 10_0138 was lodged and approved in 2014 to adjust the location of the raw water pipeline and associated pump station.

A third modification to PA 10_0138 was lodged in May 2016 and approved in January 2017 to amend the percentage of employee bus use to better reflect the locally residing workforce and associated transport regime.

A fourth modification to PA10_0138 was lodged in 2017 and withdrawn in 2018 in relation to sound power level conditions.

A fifth modification to PA10_0138 was lodged in December 2019 and approved in January 2020 to allow for the installation of a water pipeline from the nearby, Whitehaven owned Olivedene property to the mining operation.

A sixth modification to PA10_0138 was lodged in December 2019 and approved in January 2020 to allow for the installation of a water pipeline from the nearby, Whitehaven owned Brighton and Roma properties to the mining operation.

A seventh modification to PA10_0138 was lodged in February 2021 and approved in August 2021 allowing for an extension of the Northern Emplacement footprint, and an increase to the maximum height of a section of the Northern Emplacement by 1 metre, incorporating macro and micro relief.

A eight modification of PA10_0138 was lodged in October 2021 and approved in January 2022 allowing for the use of mobile coal sizing within the MCCM operation and the burial of tyres within the MCCM emplacement areas.

2.2 Mine Contacts

The key operational personnel responsible for environmental management at MCCM during the reporting period included:

Name	Jorge Moraga
Title	General Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

Name	Prashant Nath
Title	Senior Operations Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

Name	Kent Taylor
Title	Mining Engineering Manager and HSEC Manager
Address	Therribri Road, Boggabri, NSW 2382
Phone Number	02 6749 7800

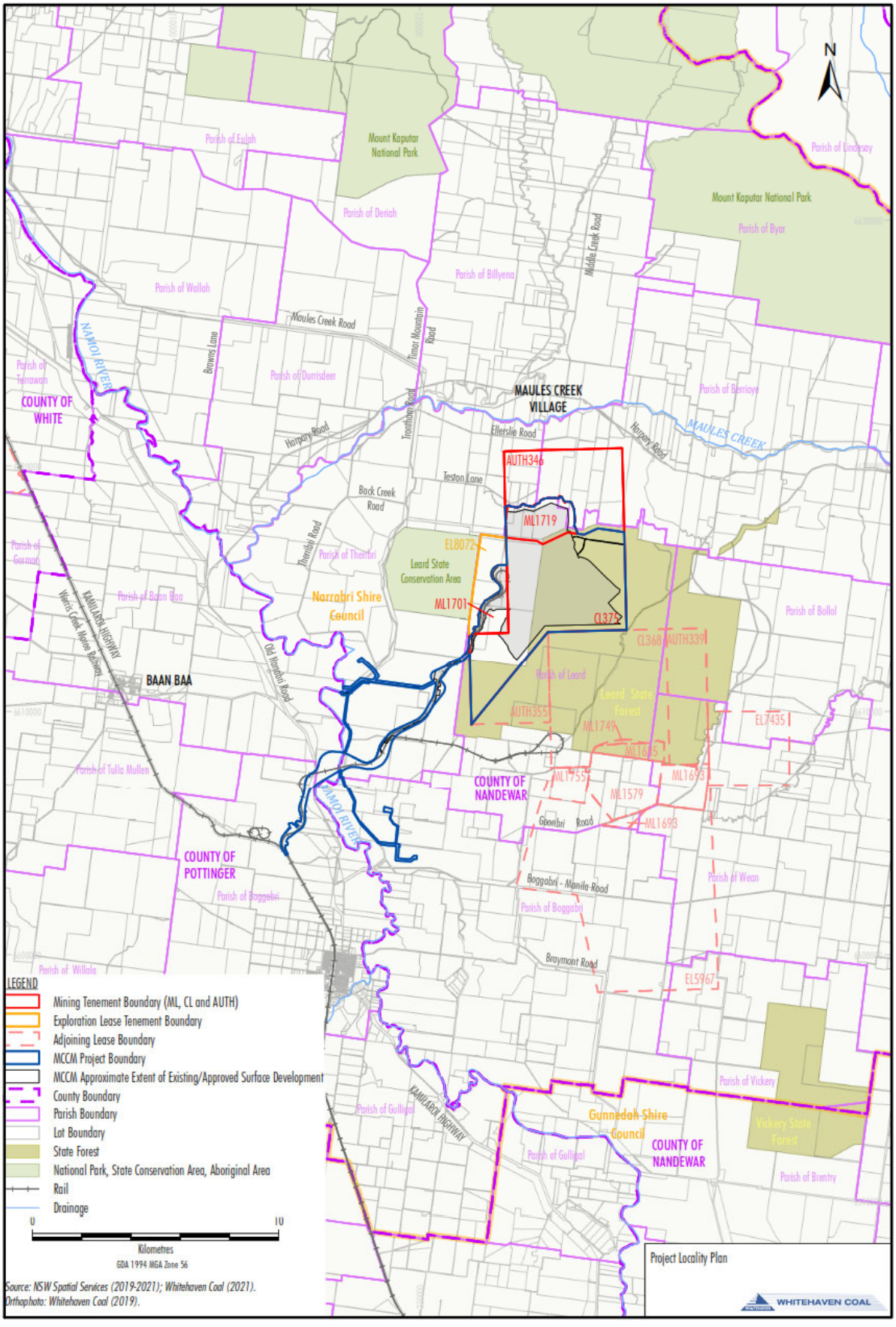

Figure 1: Project Locality Plan

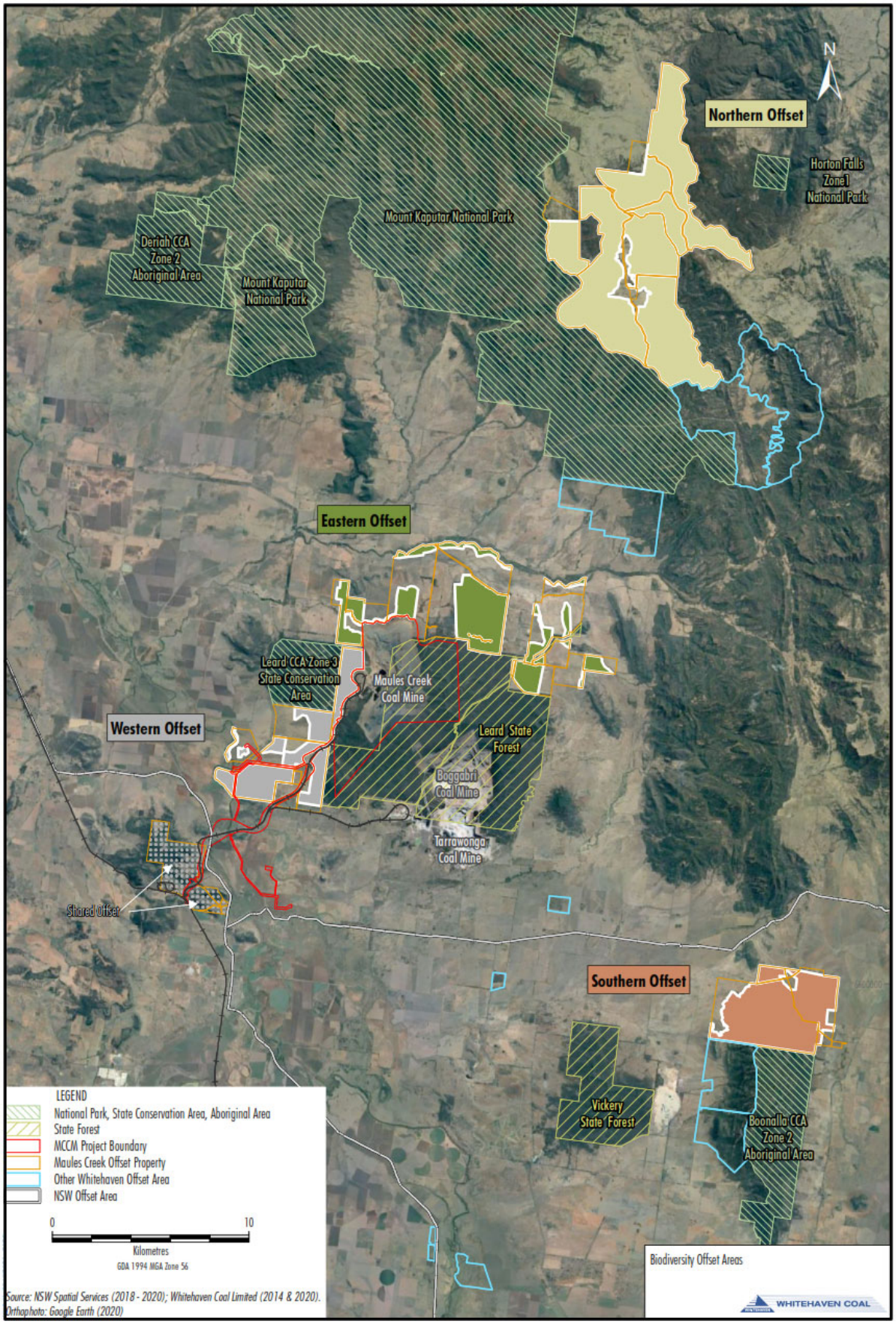

Figure 2: Biodiversity Offset Areas

3 APPROVALS

Table 5 provides a summary of the key licences, leases and approvals that have been obtained for the MCCM to enable the construction and operation of the mine.

Table 5: Licences, Leases and Approvals

Approval	Reference	Detail	Validity Dates
Project Approval	PA 10_0138	Pursuant to the Project EA, the PAC approval of the MCCM referred to in Schedule 1 subject to the conditions in Schedules 2 to 5.	23 October 2012 to December 2034
Project Approval Modification	PA 10_0138 (MOD1)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow modifications to infrastructure requirements.	Granted on 25 July 2013
Project Approval Modification	PA 10_0138 (MOD2)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow the design of key water related infrastructure to be optimised.	Granted on 10 March 2014
Project Approval Modification	PA 10_0138 (MOD3)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to amend the employee bus use percentage to better reflect the locally residing workforce and associated transport regime.	Granted on 13 January 2017
Project Approval Modification	PA 10_0138 (MOD5)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow the installation of a water pipeline from the nearby Whitehaven owned Olivedene property to the mining operation.	Granted on December 20 2019
Project Approval Modification	PA 10_0138 (MOD6)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow the installation of a water pipeline from the nearby, Whitehaven owned Brighton and Roma properties to the mining operation.	Granted on December 20 2019

Approval	Reference	Detail	Validity Dates
Project Approval Modification	PA 10_0138 (MOD7)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow for an extension of the Northern Emplacement footprint, and an increase to the maximum height of a section of the Northern Emplacement by 1 metre, incorporating macro and micro relief.	Granted on August 2021
Project Approval Modification	PA 10_0138 (MOD8)	Pursuant to the Maules Creek Project Approval Modification Environmental Assessment, the Modification was granted to allow for improved operating efficiencies through the use of mobile coal sizing equipment and mobile rock crushing equipment, as well as disposal of waste heavy vehicle tyres in the waste rock emplacement areas.	Granted on January 2022
Coal Lease	CL 375	Covers an area of approximately 4,200 hectares (ha). The southern part of the lease covers rights to mine from the surface to unlimited depth (~2,500 ha). The northern part of the lease covers rights to mine from 20 metre (m) depths to unlimited depth (~1,700 ha).	4 June 1991 to 4 June 2033
Authorisation	A 346	Covers the rights of the northern part of CL 375 from the surface to 20 m depth (1270 ha).	Renewed 2016 Expires 28 February 2028
Mining Lease	ML 1719	Covers the area to the north of the surface rights of CL 375, over a portion of A 346 that will accommodate part of the Northern Overburden Emplacement Area (OEA) for the MCCM.	Granted 11 November 2015 to 11 November 2036
Mining Lease	ML 1701	Covers the area to the west of CL 375 within the Project Boundary that will facilitate the extraction of some coal and accommodate some mine related infrastructure.	Granted 9 October 2014 to 9 October 2035
Exploration Lease	EL 8072	Covers an area west of ML1701 (303 ha)	Renewal pending

Approval	Reference	Detail	Validity Dates
Environment Protection Licence	EPL 20221	The NSW Environment Protection Authority (EPA) issues environment protection licences to the owners or operators of various industrial premises under the *Protection of the Environment Operations Act, 1997* (POEO Act).	Issued 2 May 2013
Environment Protection Licence Variation	EPL 20221	Variation of the EPL to allow for tyre burial in the MCCM pit	Approved 30 March 2022
Maules Creek Coal Complex Forward Plan	January 2023 – January 2026	Details mining and rehabilitation activities during the applicable period at MCCM	Approved In March 2023
Forest Corporation NSW Compensation	N/A	Agreement applies to part of Leard State Forest No. 420 that occurs within CL 375 and any mining lease pursuant to MLA 404 being ML1719.	Updated 1 July 2021
Emergency Tailings Emplacement	N/A	Notification of High Risk Activity – Emergency Tailings Emplacement	Notification provided April 2015.
Surface Water Licence Water Supply Works and Water Use Approval	WAL41585	Previously 90SL101060. Water supply for mining and irrigation one overshot dam and a 150 millimetre (mm) Centrifugal Pump. 30 units. Under works approval 90CA834999	Converted to WAL41585 Renewed 1 July 2017. Expires 9 November 2025
Water Supply Works Approval	90WA801901 DWE Ref no: 90AL801900	Allows construction of a 610 mm Axial Flow Pump located on the Namoi River.	Issue date: 1/07/2004 Expiry date: 30/06/2027
Water Access Licence	WAL12811	135 ML with works approval 90CA807230. Upper Namoi Zone 5 Namoi Valley (Gins Leap to Narrabri) Groundwater Source.	Issue Date: 1/11/2006 Expiry Date: 6/11/2030
Water Access Licence	WAL12791	112 ML with works approval 90CA807180. Upper Namoi Zone 5, Namoi Valley (Gins Leap to Narrabri) Groundwater Source.	Issue Date: 1/11/2006 Expiry Date: 31/10/2026
Water Access Licence	WAL29467	306 ML water licence from porous rock water source for construction purposes. Refer 90WA822412	Issue Date: 16/01/2012 Expiry Date: 6/06/2025

Approval	Reference	Detail	Validity Dates
Water Access Licence	WAL 27385	38 ML water licence from Namoi Groundwater Zone 4.	Granted 24 April 2012 for perpetuity.
Water Access Licence	WAL12479	78 ML water licence from Namoi Groundwater Zone 11 under works approval 90CA807652.	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Water Access Licence	WAL27383	0 ML water licence from Namoi Groundwater Zone 11.	Spare WAL. Granted 24 October 2011 for perpetuity.
Water Access Licence	WAL13050	3000 ML water licence from Lower Namoi Regulated River Water under works approval 90WA801901.	Issue Date: 1/07/2004 Expiry Date: 30/06/2027
Water Access Licence	WAL36641	800 ML water licence from Gunnedah-Oxley Basin MDB groundwater source.	Perpetuity
Water Access Licence	WAL12491	77 ML water licence from Upper Namoi Zone 11 under works approval 90CA807676	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Water Access Licence	WAL12480	215 ML water licence from Upper Namoi Zone 11 under works approval 90CA807654.	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Water Access Licence	WAL12645	35 ML water licence from Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap). Under works approvals 90CA806981	Issue Date: 1/11/2006 Expiry Date: 31/10/2026
		35 ML water licence from Upper Namoi Zone 4, Namoi Valley (Keepit Dam to Gin's Leap). Under works approvals 90CA806830 & 90WA807004	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Water Access Licence	WAL12718	102 ML Water licence from the upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source. Under works approval 90CA807012	Issue Date: 1/11/2006 Expiry Date: 19/05/2031

Approval	Reference	Detail	Validity Dates
Water Access Licence	WAL12722	77 ML water licence from Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin's Leap) Groundwater Source. Under works approval 90CA807023	Issue Date: 1/11/2006 Expiry Date: 27/05/2031
Bore Licence	90CA807230	Bore Constructed in the Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source. Works approval for WAL12811.	Issue Date: 1/11/2006 Expiry Date: 6/11/2030
Bore Licence	90CA807180	Bore Constructed in the Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source. Works approval for WAL12791.	Issue Date: 1/11/2006 Expiry Date: 31/10/2026
Bore Licence	90WA822412	Previously 90BL255704. Gunnedah – Oxley Basin Murray Darling Basin Groundwater Source. Works approval for WAL29467.	Granted 16 January 2012 to 06 June 2025
Bore Licence	90CA807652	Upper Namoi Zone 11, Maules Creek Groundwater Source. Works approval for WAL12479.	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Bore Licence	90WA801901	Lower Namoi Regulated River Water Source. Works approval for WAL13050.	Issue Date: 1/07/2004 Expiry Date: 30/06/2027
Bore Licence	90CA807676	Upper Namoi Zone 11, Maules Creek Groundwater Source. Works approval for WAL12491.	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Bore Licence	90CA807654	Upper Namoi Zone 11, Maules Creek Groundwater Source. Works approval for WAL12480.	Issue Date: 1/11/2006 Expiry Date: 31/10/2029
Bore Licence	90CA807012	Bore Constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source. Works approval for WAL12718.	Issue Date: 1/11/2006 Expiry Date 19/05/2031
Bore Licence	90CA807023	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin'S Leap) Groundwater Source. Works approval for WAL12722.	Issues Date: 1/11/2006 Expiry Date: 27/5/2031

Approval	Reference	Detail	Validity Dates
Bore Licence	90WA809127	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA820120	Previously 90BL001144. Gunnedah – Oxley Basin Murray Darling Basin Groundwater Source.	Granted 28 February 1939 for perpetuity. Converted 16 January 2012.
Bore License	90MW8333037	Gunnedah - Oxley Basin Murray Darling Basin Groundwater Source. Works approval for WAL36641	Perpetuity
Bore Licences	90BL255779 90BL255780 90BL255781 90BL255782 90BL255783 90BL255784 90BL255785 90BL255786 90BL255787 90BL255788 90BL255789 90BL255790	For the purpose of Monitoring Bores.	Granted 25 August 2010 for perpetuity.
Bore Licence	90WA809078	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA809079	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gins Leap) Groundwater Source.	Commencement 1 November 2006
Bore Licence	90WA809300	Bore constructed in the Upper Namoi Zone 4 Namoi Valley (Gins Leap to Narrabri) Groundwater Source.	Commencement 1 November 2006

4 OPERATIONS SUMMARY

4.1 Exploration Activities

Exploration drilling was undertaken during the reporting period in accordance with the approved Mining Operations Plan (MOP) to further assist production planning and assess coal reserves within CL 375. Core and chip holes were undertaken to further define coal quality, geotechnical and structural information.

4.2 Construction

During the reporting period the following construction works occurred:

- Construction of critical spares shed
- SD3 Culvert installation
- Decommissioning of Dams along access road
- HV Wash Bay Concrete Extension
- Kamilaroi Highway to Maules access road resealing
- Course coal effluent pipework
- Enaex Reload Yard containment sumps
- Centrifuge platforms installation

4.3 Mining Operations

Pre-mining clearance activities including ecological, archaeological and soil analysis were undertaken in line with the relevant approvals and management plans. The 2023 vegetation clearing activities were completed during the approved annual clearing period (15th February to the 30th April 2023).

Topsoil was reclaimed and stockpiled for later use on rehabilitation areas. Overburden was blasted prior to being removed by loaders and excavators then transported by haul trucks to both in and out of pit dumps, allowing for coal extraction. Reject material from washed coal was dumped in designated areas in line with the relevant waste and dump management plans. Table 6 below presents the production summary for the 2022, 2023 and 2024 reporting periods.

Table 6: Production Summary

Material	Approved limit	2022 (actual)	2023 (actual)	2024 (forecast)
Waste Rock/ Overburden	81,000,000m^3 (MOP Year 1, 2017, Table 4)	57,864,598	62,178,549	67,000,000
ROM Coal	13 Million Tonnes (PA10_0138 Sch. 2 Cond.6) > 5 Million Tonnes handled (EPL 20221)	10,204,445	11,653,467	11,700,000
Reject Material	NA	2,867,231	2,961,698	3,600,000
Saleable Product	12.4 Million Tonnes (PA 10_0138 Sch.2 Cond.9) > 5 Million Tonnes produced (EPL 20221)	8,764,822	7,217,970	8,900,000

4.4 Coal Handling and Processing

Product coal generated by the MCCM includes bypass coal (i.e. ROM coal that is crushed and screened but not washed in the CHPP) and washed coal that is processed in the CHPP. The product coal is stockpiled and then reclaimed and fed via conveyors to the train loading facility. Once loaded, trains travel from the MCCM via the Maules Creek Rail Spur, the shared rail spur with Boggabri Coal and the Werris Creek to Mungindi Railway Line to the Port of Newcastle for export.

4.5 Other Operations

4.5.1 Hours of Operation

Mining operations are conducted up to 24 hours per day, seven days per week.

4.5.2 Transport Rates

All coal produced by MCCM is transported from site via the Maules Creek rail spur, and the shared portion of the Boggabri Coal rail spur in accordance with PA 10_0138 (Schedule 2, Condition 8 and 9; Schedule 3, Condition 65) (Table 7). Appendix B details the coal transport records in accordance with the reporting requirements under Condition 65 (a) and (b) of PA 10_0138.

Table 7: Coal Transport

Parameter	Criteria	Total
Maximum number of laden trains from the site in any one day	10	7
Maximum number of laden trains from the site in a day when averaged over a calendar year	7	2.81
Maximum Tonnes of product coal transported from the site (Mt)	12.4	8.01

4.6 Next Reporting Period

4.6.1 Exploration

Exploration drilling will continue to be undertaken at MCCM to further assess the coal reserves within the tenements, focusing on further exploration within ML 1701.

4.6.2 Construction Activities

- Commissioning of the life of mine pumping circuit.
- Splash curtains on reject bin.
- Training Simulator
- In pit production hub

4.6.3 Mine Operations

The mine production rates are planned to achieve approximately 12 Mtpa of ROM coal and approximately 65 million bank cubic metres (Mbcm) of overburden during 2024.

Vegetation clearing activities in mining areas over the next reporting period will be conducted in accordance with relevant Environmental Management Plans as the north eastern section of the pit extends. The clearing program will be undertaken during the annual clearing period from the 15 February to the 30 April, except under exceptional circumstances and with the approval by the Secretary of the DPHI.

4.6.4 Overburden Emplacements

The OEA and north pit expansion will continue to develop in accordance with Project Approval PA 10_0138 and the MCC Forward Plan which are available on the Whitehaven Coal website.

4.6.5 Mining Fleet Upgrades

The haulage fleet configuration was stable with no changes during 2023. As required, assets are converted to work in the Autonomous Haulage System where they receive additional hardware and software to make them compatible with the operating systems.

The dig fleet was reduced by one Hitachi 3600 excavator in the 2023 reporting period.

Additional procurement of mining fleet will be subject to mine planning requirements in 2024.

5 ACTIONS REQUIRED FROM PREVIOUS ANNUAL REVIEW

There were no requests from the then DPE in the 2022 MCCM Annual Review.

6 ENVIRONMENTAL PERFORMANCE

The following sub-sections report on the environmental performance achieved during the reporting period and provide a summary of the environmental monitoring data compared to data predictions, trends and management measures.

6.1 Meteorological Monitoring

Meteorological monitoring is conducted onsite in accordance with Schedule 3 Condition 35 of the PA 10_0138 at the MCC Automatic Weather Station (AWS), the location of the AWS is depicted in Figure 3. The total annual rainfall recorded for 2023 was approximately 499.8 millimetres (mm), this is below the average rainfall predicted in the EA.

The temperature records and wind patterns on site are relatively consistent with the long term climatic data recorded at nearby BOM sites, and the EA predictions. The average temperature during the reporting period was 18.4°C, the minimum temperature was -4.4°C, recorded in July and a maximum temperature of 40.5°C was recorded in December. The average wind direction for the entire reporting period was from the southern quadrant, predominately from the south, south west.

6.2 Air Quality

6.2.1 Environmental Management

Potential impacts to air quality are managed in accordance with the:

- Air quality criteria prescribed under schedule 3 condition 29 of the Project Approval;
- Relevant EPL conditions; and
- The MCC Air Quality and Greenhouse Gas Management Plan (AQGGMP).

Maules Creek Coal Mine implements a range of controls to manage dust, including but not limited to:

- Utilising water carts across site with water fill points appropriately positioned for efficient coverage.
- Use of a dust suppressant additive on targeted haul roads;
- Visual dust assessments regularly undertaken on haul roads;
- Modification of work practices where required including changing dumping strategies;
- Temporary cessation of operational equipment as required;
- Predictive controls and Air Quality Trigger Action Response Plan (TARP) together with the daily risk report presented to key operational personnel;
- Pre-strip areas are kept to a minimum and mulch cover used on cleared areas ahead of mining activities where possible;
- Operation of a real time SMS alarming system notifying of elevated dust levels;
- Site vehicles restricted to designated routes, with speed limits enforced;
- Blasting activities restricted to suitable weather conditions;
- 24 hour notification to key stakeholders and residents of planned blasts;
- Water suppression on conveyor transfers and stockpiles at the CHPP;
- Additional units within the air quality monitoring network; and
- Meteorological monitoring system used to identify conditions pertaining to elevated dust risk.

The MCC Air Quality Monitoring network is illustrated in figure 3 and includes:

- Continuous monitoring of PM_{10} levels at TEOM1 and TEOM3. These results are available publicly via the EPA website.
- TEOM2, shown in Figure 3**:** is located on WHC land and the results are used by MCC for internal management purposes only.
- PM_{10} levels are also measured at a High Volume Air Sampler (HVAS) on a twenty-four hour basis every six days. Total Suspended Particulate Matter (TSP) is inferred from the measured PM_{10} data.
- A network of four depositional dust gauges (DDG's), measuring deposited dust and particulates on a monthly basis.

- Additional sampling units (E-sampling trailer units) to provide input data for the predictive air quality monitoring software.

In addition to the above, the Boggabri - Tarrawonga - Maules Creek (BTM) Air Quality Management Strategy (AQMS) was approved in 2017. Predictive air quality modelling simulation software is fully implemented to inform operational risk. During the reporting period new predicative air quality software was trialled and implemented across the BTM

The NSW Office Environment & Heritage (OEH) and the NSW EPA installed a number of TEOM monitoring units in late 2017. The Namoi Region Air Quality Advisory Committee was established by the Minister for the Environment of which Whitehaven Coal is a stakeholder on the committee.

Daily ambient air quality data for PM10 and PM2.5 particulate sizes from the Maules Creek TEOM1 monitoring unit is provided and published on the OEH managed air quality website. This has occurred since 2016 prior to the establishment of the Namoi Region Air Quality Monitoring Project.

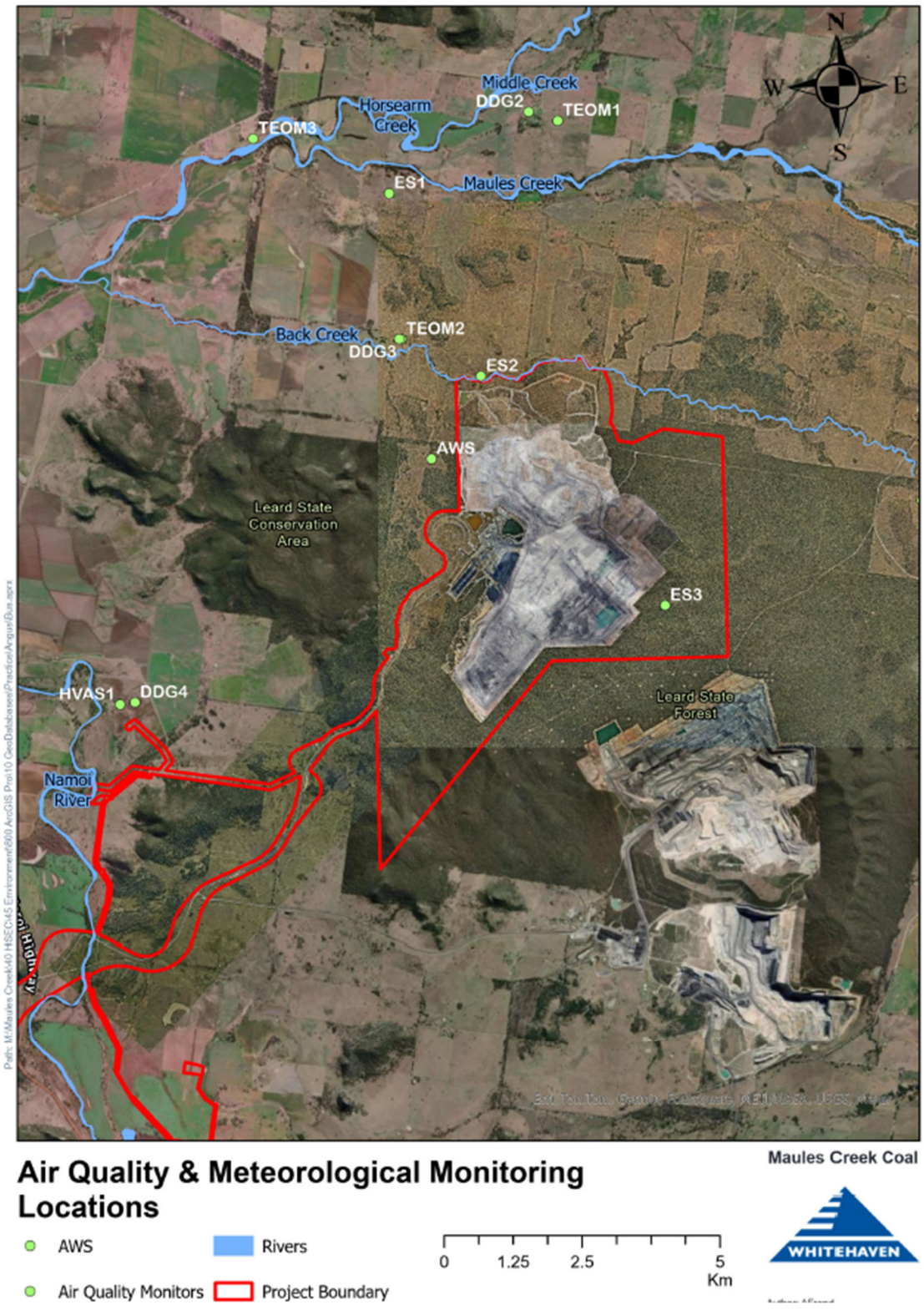

Figure 3: Air Quality and Meteorological Monitoring Locations

6.2.2 Environmental Performance

A summary of the depositional dust air quality monitoring results at MCCM for the 2023 reporting period is provided in Table 8.

Table 8: Deposited Dust Monitoring Results 2023

Month	MC1 (g/m^2)	MC2 (g/m^2)	MC3 (g/m^2)	MC4 (g/m^2)
January	1.3	2.7	6.5c	0.5
February	5.9c	2.8	2.0	1.6
March	4.2c	1.6	1.7	2.2
April	7.7c	1.5	2.8	13.8c
May	5.9c	4.9	4.8	1.0
June	3.2	2.3	2.0	1.0
July	5.1c	0.9	0.6	3.3
August	0.8	0.3	0.4	0.1
September	1.9	2.1	1.8	0.6
October	0.6	5.3c	2.0	0.9
November	3.8c	2.2	3.8c	1.0
December	2.5	0.5	0.6	0.4
Annual Average	1.7	2.0	1.9	1.2

C = Results contaminated by deposits deemed unrelated to mining activities (bird droppings, insects and vegetation).

Deposited dust monitoring data remained compliant with the Project Approval (<4g/m2 averaged annually) throughout 2023. Dust gauge results can be significantly impacted by localised sources (e.g. due to dust from livestock, agriculture, lawn mowers, cars travelling on local dirt roads, etc.) and are susceptible to contamination from organic material (such as plant detritus and droppings from birds which often perch on the gauges). As dust fallout generally occurs within relatively close proximity to sources, elevated dust gauge results are often caused by sources nearby to the monitor. However during certain meteorological conditions results can also be influenced by sources further afield and larger scale events such as regional dust storms.

The annual average deposited dust levels measured during 2023 have been compared with the modelling predictions for Year 10. For the purpose of assessing compliance with approved modelling, the level excluding contaminated data has been considered. The measured annual average deposited dust levels in 2023 were elevated when compared with the modelling predictions. It is however noted that the modelling predictions from the AQA used an annual average deposited dust background (contribution from non-mining sources) of 0.5 g/m2 /month whilst the historical pre mining era deposited dust monitoring data (collected from 1982 to 1986) presented in the AQA show an annual average of 1.9g/m2 /month deposited dust in the area. It is therefore considered that the background deposited dust concentration was potentially underestimated in the modelling. If an approximate background of 1.9g/m2 /month were adopted in the predicted levels, the measured annual

average deposited dust levels (excluding contaminated data) in 2023. would generally be well aligned with the predicted levels.

PM_{10} 24Hr and Annual Average (TEOM1)

The results collated from TEOM1 did not exceed the 24Hr criteria of 50 µg/m^3 or the rolling average criteria of 30 µg/m^3 (Graph 1), excluding extraordinary weather events which were reported to DPHI. The collated data displays a slow upward trend as, a result of the reduced rainfall in 2023 in comparison to the previous two reporting periods.

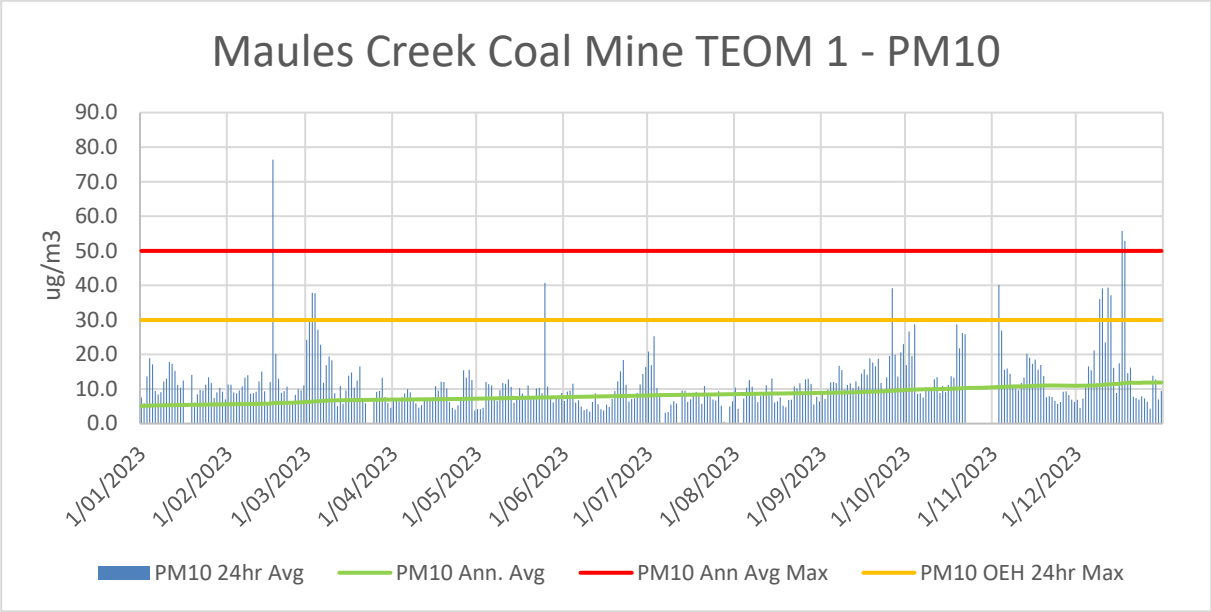

Figure 4: 24Hr and Annual Average PM_{10} (TEOM1)

PM_{10} 24Hr and Annual Average (TEOM3)

The results collated from TEOM3 did not exceed the 24Hr criteria of 50 µg/m^3 or the rolling average criteria of 30 µg/m^3 (Graph 1), excluding extraordinary weather events which were reported to DPHI. The collated data displays a slow upward trend, as a result of the reduced rainfall in 2023 in comparison to the previous two reporting periods.

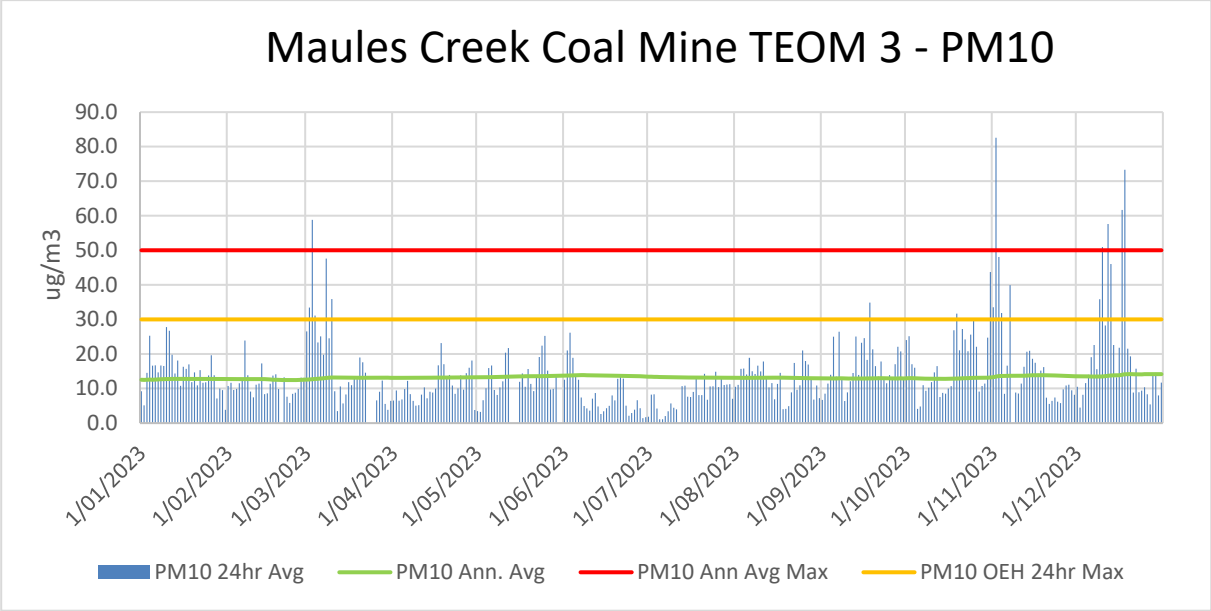

Figure 5: 24Hr and Annual Average PM_{10} (TEOM3)

PM_{10} 24Hr and Annual Average (HVAS)

The HVAS PM_{10} monitoring results collated during the reporting period did not exceed the 24Hr criteria of 50 µg/m^3 or the rolling average criteria of 30 µg/m^3 (Graph 3). The collated data displays a slow upward trend, as a result of the reduced rainfall in 2023 in comparison to the previous two reporting periods, this aligns with the decrease in rainfall experienced in 2023.

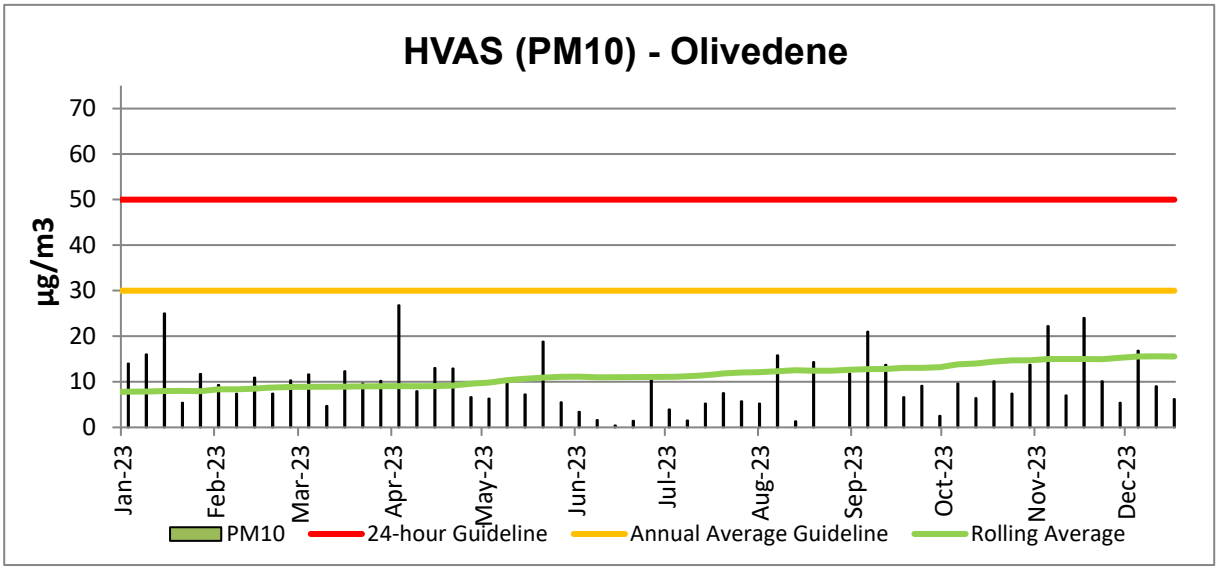

Figure 6: PM_{10} 24Hr and Annual Average HVAS

HVAS Total Suspended Particulates (TSP) Annual Average

The TSP rolling annual average during the reporting period did not exceed the 90 µg/m^3 criteria this is inferred from the HVAS PM10 data.

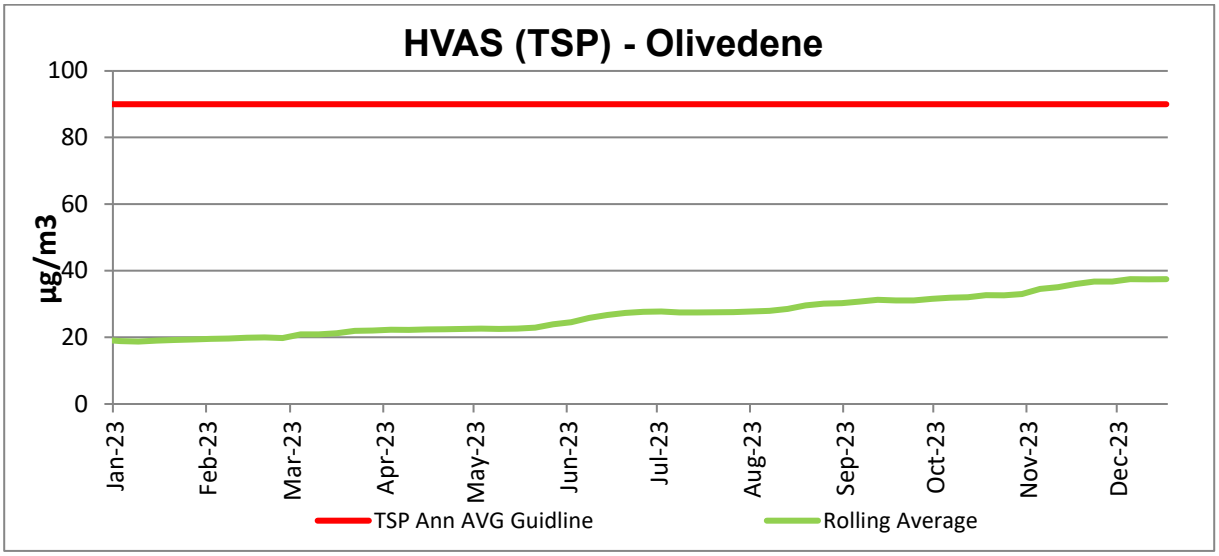

Figure 7: HVAS TSP

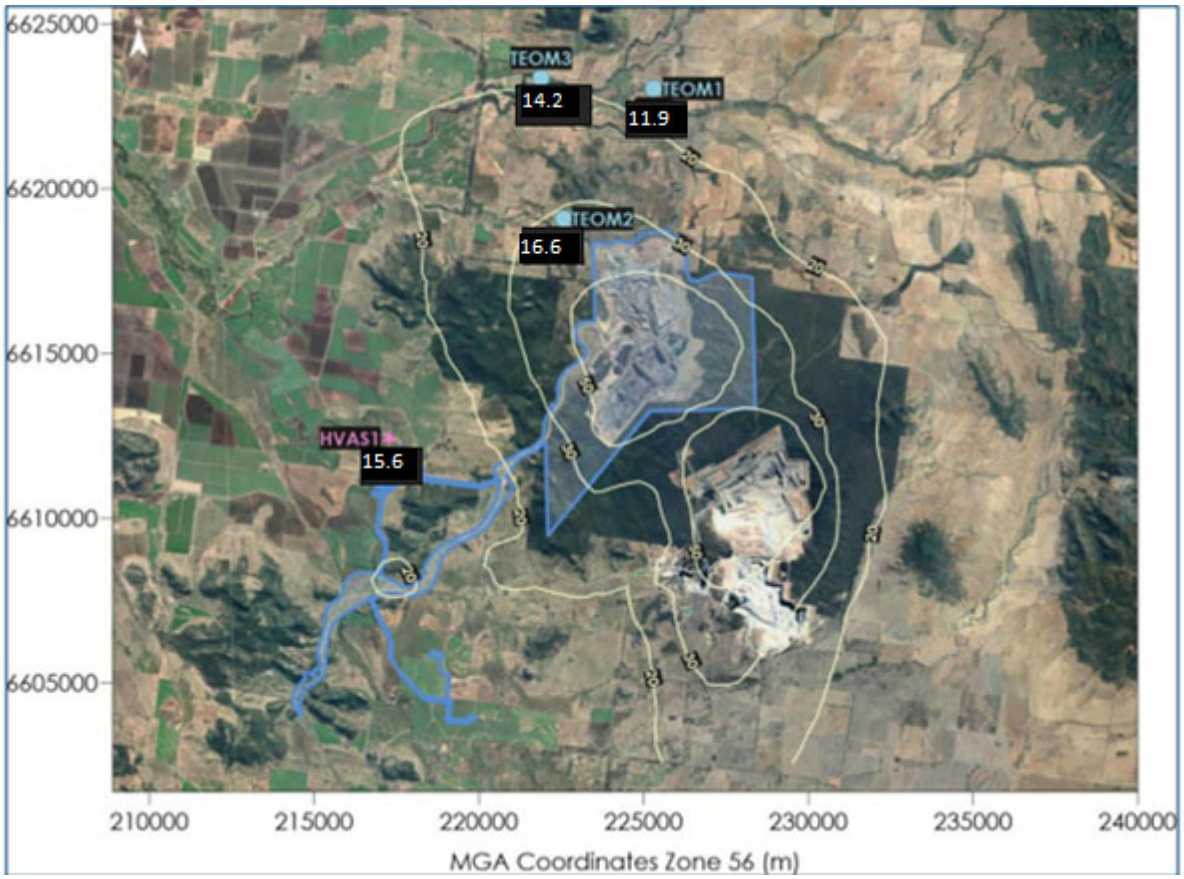

Figure 8: Comparison of Annual Average PM_{10} levels (µg/m^3) and 10 year prediction

All air quality parameters measured during 2023 have been compared with the 10 year modelling predictions, with all found to generally align with the modelling predictions seen in figure 8.

6.2.3 Proposed Improvement Measures

Proposed measures to continuously improve include:

- Continued application of the BTM predictive modelling software and refinement where necessary;
- Continual increase of in-pit dumping;
- Continue overburden shaping to assist with enabling the placement of topsoil and rehabilitation establishment in the northern emplacement of the MCCM footprint; and
- Continued engagement with the EPA regarding the Namoi Regional Air Quality Monitoring network.

6.3 Greenhouse Gas

6.3.1 Environmental Management

Greenhouse Gas (GHG) emissions at MCCM are managed in accordance with Schedule 3 Condition 27 of PA 10_0138 and the AQGHGMP. The main sources of GHG emissions considered in the AQGHGMP are:

- Fuel consumption (diesel) during mining operations – Scope 1.
- Release of fugitive methane (CH_4) from the fracturing of coal seams – Scope 1
- Indirect emissions resulting from the MCCM's consumption and use of purchased electricity – Scope 2.

Electricity

A number of controls were applied to reduce electricity consumption at the MCCM during the reporting period, including:

- The energy efficiency of new electrical equipment is considered during procurement.
- Use of variable speed drives on pumps and conveyors in the CHPP.
- Avoiding idle running of conveyors in the CHPP.
- Management of lighting around the mine site.
- Use of bypass coal.

From October 2022 WHC offset Scope 2 emissions by purchasing 100% carbon neutral electricity across all operations.

Diesel Consumption

A number of controls were applied to reduce diesel consumption at the MCCM during the reporting period including:

- Ensuring dump trucks are fully loaded where possible prior to hauling to maximise efficiency, i.e. fuel used per unit of material moved.
- Maximising the efficiency of the mining fleet through regular maintenance;
- Mine planning efficiencies to minimise the gradient, length and height of loaded haul runs for dump trucks, where possible.
- In-pit and mobile refueling facilities.
- Monitoring system for heavy vehicle use and fuel burn. This system also determines individual equipment utilisation which assists in minimising fleet size and associated wastage.
- Continued operation of the employee shuttle bus system to and from site.
- Maximising in-pit dumping

6.3.2 Environmental Performance

Greenhouse Gas emissions associated with the MCCM are reported through participation in the National Pollutant Inventory (NPI) and as part of the Whitehaven Group in the National Greenhouse and Energy Report Scheme (NGERS). NPI data is publicly available on The Australian Department of Agriculture, Water and the Environment website. The total GHG Emissions attributed to the MCCM reported for the NGERS 2023 Financial Year (FY) reporting period was 279,914 t CO_2-e. This shows a decrease on previous years consistent with a decrease to ROM coal and total over burden moved.

The following sections detail the three key GHG contributors calculated for the 2023 NGER reporting period. Prior years reported higher than the EA estimated fugitive emissions. This was a result of the emissions calculation method used for fugitive gas that utilised the Method 1 approach, which is an over-estimation versus a significantly lower and closely aligned to current Method 2 site specific emission factor applied during the development of the EA.

Diesel Usage

92,063kL of diesel (stationary and transport use) was consumed equating to 249,469 tCO_2-e GHG Emissions. Diesel usage was slightly higher than that estimated in the EA. This can be attributed to longer hauls which were experienced in relation to overburden placement in out of pit dumps.

Fugitive Emissions

There was an estimated total of 7,816 tCO_2-e fugitive emissions from MCCM in the 2023 FY. This is slightly higher than the EA estimation of 7,310 tCO_2-e for 2023 FY which has been updated to reflect updated global warming potentials for methane.

Electricity Consumption

29,892 MWh power equating to approximately 21.821 kT CO2-e was consumed by MCCM. This is a decrease from 2022 FY and less than the predicted consumption from the EA of Scope 2 emissions of 54.635 kT CO2-e.

6.3.3 Proposed Improvement Measures

Management measures described above will continue to be implemented during the next reporting period. In pit dumping will continue with reliance on out of pit dumps reducing resulting in a reduction of diesel usage.

6.4 Noise

6.4.1 Environmental Management

Potential noise impacts associated with the MCCM are managed in accordance with the:

- Noise criteria and operating conditions prescribed under Schedule 3 Conditions 7 and 15 of PA 10_0138.
- EPL 20221 Conditions L4 and M8.
- The MCC Noise Management Plan (NMP) approved by DPE, and prepared to satisfy the requirements of the EPL and PA 10_0138.

Additionally, various controls were implemented to manage noise during the reporting period, including but not limited to:

- Real-time unattended noise monitoring systems at representative locations within the local area.
- Monthly compliance attended monitoring by independent acoustic consultants.
- Meteorological forecasting and daily risk reporting to advise of weather conditions in advance.
- Annual noise model validation (refer 6.4.2).
- Continued monitoring of TARP levels and dissemination of trigger alerts to MCCM personnel via SMS.
- Training of dispatch and supervisors regarding noise management and TARP's.
- Dispatch operator that monitors real time noise data and can advise of any required modifications to work practices. Modifications may include changing dumping strategies, reducing the number of machines operating or ceasing operations.
- Roaming inspections by personnel at offsite locations to identify any audible mine related noise.
- Installation of a Multi-Directional Noise Compass.
- Utilising overburden emplacement areas with acoustic shielding and higher windrows.
- Equipment sound power testing and analysis of fixed and mobile fleet.
- Operator training and awareness to reduce equipment noise.
- Use of 'silent horns' on the excavator and supporting truck fleet.
- Ongoing maintenance of the MCC mining fleet including any noise suppression equipment.
- Design and trials of new muffler systems on Hitachi 5000 class trucks.
- Low frequency noise assessments.

The MCCM noise monitoring network is illustrated in Figure 9 and includes:

- Continuous monitoring at real-time monitoring units that are utilised for daily management purposes.

- Monthly attended monitoring at six locations as described in the EPL (NM1 to NM6).

6.4.2 Environmental Performance

Attended Monitoring

The Noise Policy for Industry (NPfI) was introduced in late 2017. The application of the low frequency assessment consistent with the NPfI was applied during the reporting period.

Attended monitoring is completed on a monthly basis by an independent consultant and is used to assess compliance with licence and approval limits for mining generated noise. Monthly noise survey results are available in the EPL monitoring data reports available on the MCCM website. During this reporting period, there were no exceedances recorded.

Data trends over the life of the mine indicate that site-only LAeq noise levels have been low (either IA, NM, or less than 30 dB) for a large majority of measurements at all monitoring locations. At NM1 site-only LAeq noise levels decreased over 2021 and 2022 and increased slightly in 2023. At NM2 site-only LAeq noise levels decreased from 2021 to 2023. NM3, NM5, and NM6, site-only LAeq noise levels have remained very low throughout the life of the project. At NM4, site-only LAeq noise levels have decreased from 2016 to 2023.

Noise levels measured in 2023 were lower than noise levels predicted for 2023 in the NIA at all monitoring locations during all measurements. As noise levels reported in the NIA represent a worst-case prediction from the noise model, it is expected that noise levels measured during attended noise monitoring will typically be lower than predicted in the NIA.

Table 9: NM1 Measured $L_{Aeq,\ 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq,\ 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	IA	-	N/A
February	N/A	22	-	N/A
March	N/A	22	-	N/A
April	N/A	IA	-	N/A
May	N/A	<20	-	N/A
June	N/A	IA	-	N/A
July	N/A	<20	-	N/A
August	N/A	IA	-	N/A
September	N/A	IA	-	N/A
October	N/A	IA	-	N/A
November	N/A	IA	-	N/A
December	N/A	IA	-	N/A

Table 10: NM2 Measured $L_{Aeq,\ 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq,\ 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	IA	-	N/A
February	N/A	29	-	N/A
March	N/A	26	-	N/A
April	N/A	<20	-	N/A
May	N/A	IA	-	N/A
June	N/A	IA	-	N/A
July	N/A	IA	-	N/A
August	N/A	<20	-	N/A
September	N/A	IA	-	N/A
October	N/A	<20	-	N/A
November	N/A	IA	-	N/A
December	N/A	IA	-	N/A

Table 11: NM3 Measured $L_{Aeq,\ 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq,\ 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	IA	-	N/A
February	N/A	IA	-	N/A
March	N/A	IA	-	N/A
April	N/A	<20	-	N/A
May	N/A	IA	-	N/A
June	N/A	IA	-	N/A
July	N/A	IA	-	N/A
August	N/A	<20	-	N/A
September	N/A	<25	-	N/A
October	N/A	<25	-	N/A
November	N/A	IA	-	N/A
December	Noise-enhancing	IA	35	NC

Table 12: NM4 Measured $L_{Aeq,\ 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq,\ 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	IA	-	N/A
February	N/A	23	-	N/A
March	N/A	25	-	N/A
April	N/A	IA	-	N/A
May	N/A	NM	-	N/A
June	N/A	IA	-	N/A
July	N/A	IA	-	N/A
August	N/A	IA	-	N/A
September	N/A	IA	-	N/A
October	N/A	<20	-	N/A
November	N/A	IA	-	N/A
December	N/A	<20	-	N/A

Table 13: NM5 Measured $L_{Aeq,\ 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq,\ 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	<25	-	N/A
February	N/A	25	-	N/A
March	Noise-enhancing	IA	35	NC
April	N/A	IA	-	N/A
May	N/A	IA	-	N/A
June	N/A	IA	-	N/A
July	N/A	IA	-	N/A
August	N/A	IA	-	N/A
September	N/A	IA	-	N/A
October	N/A	IA	-	N/A
November	N/A	IA	-	N/A
December	N/A	IA	-	N/A

Table 14: NM6 Measured $L_{Aeq, 15\ Minute}$ Compared to 5 Year Predicted $L_{Aeq, 15\ Minute}$

Month	Applicable meteorological condition [1,2]	Measured MCCP $L_{Aeq,15minute}$	Predicted MCCP $L_{Aeq,15minute}$	Difference [3]
January	N/A	IA	-	N/A
February	N/A	IA	-	N/A
March	N/A	<20	-	N/A
April	N/A	IA	-	N/A
May	Noise-enhancing	IA	35	NC
June	N/A	IA	-	N/A
July	N/A	IA	-	N/A
August	N/A	IA	-	N/A
September	N/A	IA	-	N/A
October	N/A	IA	-	N/A
November	N/A	NM	-	N/A
December	Noise-enhancing	IA	35	NC

Notes:
1. Refer to Table 3.1 for applicable meteorological conditions.
2. NA indicates meteorological conditions during the measurement did not correspond with any modelled meteorological conditions and were not applicable for comparison.
3. NC indicates measured MCCP site L_{Aeq} noise levels were inaudible (IA), not measurable (NM), or expressed as a "less than" quantity (eg less than 30 dB), therefore measured and predicted noise levels were not comparable.

Table 15: Applicable Meteorological Conditions

Parameter	Night period	
	Standard meteorological conditions	Noise-enhancing meteorological conditions
Wind speed (m/s)	0.0 – 1.0	1.0 – 3.0
Wind direction (°)	All	All
Stability category	A-D	F

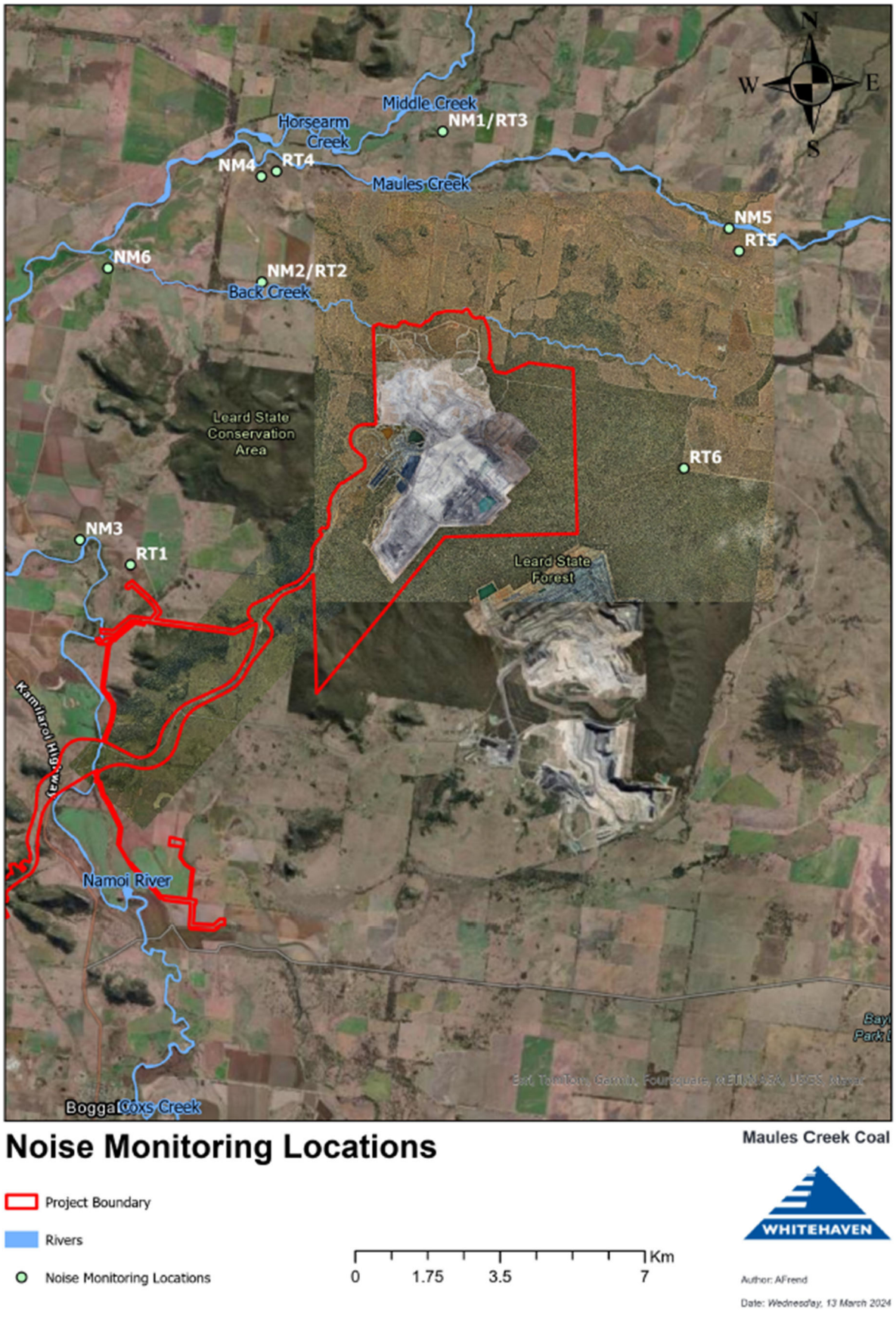

Figure 9: Noise Monitoring Network Locations

Annual Sound Power Testing

Sound power level testing of fixed and mobile plant was undertaken and results are provided in Appendix C. One-third of all plant are required to be measured on a three year-rolling basis. 45 individual pieces of mobile plant were tested during the reporting period. Sound power levels from all mobile plant were less than or equal to the predicted sound power targets described in the Project EA for modelling purposes. Results recorded for one piece of stationary plant within the CHPP was greater than the power targets described in the Project EA. This is a result of in-service testing, the layout and operation of the CHPP which increases background noise levels and reduces the available measurement positions used in the assessment. This is considered a technical non-compliance as the overall sound power of MCCM was consistent with predictions. Performance measurements through monthly attended monitoring results support the position that MCC is operating generally in accordance with the respective Project Approval and EPL 20221 criteria for mining noise. MCCM is continuing to further develop solutions to manage sound power levels on mobile equipment. Such as ongoing work to improve exhaust systems on the Hitachi haul truck fleet.

Annual Noise Validation

MCCM engaged Global Acoustics to undertake a validation assessment of the site noise model to fulfil the requirements of the MCC Noise Management Plan (NMP) and Schedule 3 Condition 16(f).

A model of operational noise used for this assessment was created with GPS trace data of actual operations on the morning of June 14 2023 to validate the site noise model. Real-time monitoring data from five locations over the winter period in 2023 were analysed to determine the upper range of measured mining noise. 90th percentile low pass LAeq was determined after data filtering then compared with the 90th percentile model. The model correlated well with actual measured levels at RT5 but was overpredicted at RT1 – RT4.

While predictions from noise monitoring were similar to model predictions presented in the Project Acoustic Impact Assessment, analysis of real time data suggests the 2023 GPS model may be more representative of a worst-case scenario and not representative of typical operations during 2023. This is supported by attended monitoring results which were inaudible or less than 25 dB at all monitoring locations during winter 2023.

6.4.3 Proposed Improvement Measures

A number of improvement measures are proposed for the next reporting period including:

- Utilise the directional noise monitor to assess noise contributions of other mining operations
- Further review of exhaust systems on haul trucks.
- Operational planning to continue to include screening options for overburden dumps.
- Pending approval and implementation of the updated NMP.
- Additional improvements to the real time environmental noise monitoring system.
- Transition to a higher volume of in-pit dumping

- Work collaboratively with Boggabri Coal and Tarrawonga Coal to minimise noise impacts

6.5 Blast

6.5.1 Environmental Management

Blast management measures are implemented at MCCM to support the management and control of post blast fume generation, dust impacts, rock fragmentation, blast overpressure and ground vibration. Blasting impacts associated with the MCCM are managed in accordance with the:

- Blasting criteria prescribed under Schedule 3 Conditions 18 to 20 of PA 10_0138.
- Blast Management Plan (BLMP), relevant MCC procedures and the BTM Blast Management Strategy (BTMBS) that have been approved to satisfy the requirements of the EPL and PA 10_0138.

During the reporting period a number of controls were applied to reduce the potential for impacts associated with blasting at the MCCM. The key controls implemented include, but were not limited to:

- Best practice blast design and drill practices in accordance with the relevant Australian Standards.
- Blast scheduling considering meteorological conditions, including wind speed and direction.
- Pre-blast assessment for each blast to determine blast exclusion zones, potential fume generation risks and appropriate controls measures to minimise potential risks.
- Review of blasts and investigations as required.
- Coordination of blasts to avoid cumulative impacts in accordance with the BLMP.
- The likelihood of fume generation is reduced through consideration of explosive product, geological conditions, best practice loading procedures, blast scheduling, 'sleep-time' and meteorological conditions.

Air blast overpressure and ground vibration monitoring are undertaken at four monitoring locations shown in Figure 10.

6.5.2 Environmental Performance

There were 112 blasts carried out during the reporting period. All blast monitors were fully operational during the reporting period. All events remained within the applicable criteria at these locations. Details of blasts are included in Appendix A. A complete capture rate for each unit occurred where blasts were above the trigger threshold. Table 16: Summary of Blasting Results summarises the blast monitoring results during the period.

As stated above there were no monitor exceedances of the applicable ground vibration and air blast overpressure limits during the 2023 reporting period at MCCM monitors. Both overpressure and ground vibration monitoring results are consistent with the predicted blasting impacts described within the EA. During the reporting period, there was one event where air blast overpressure monitoring results at two blast monitors (BM2 & BM3) were above the 95th percentile limit.

Table 16: Summary of Blasting Results

Location	Parameter	Average	Maximum	100% Limit	Exceedance
BM1	Air blast overpressure (dB(Lin Peak))	90.4	107.4	120	-
	Vibration (mm/s)	0.1	0.3	10	-
BM2	Air blast overpressure (dB(Lin Peak))	95.0	117.4	120	-
	Vibration (mm/s)	0.1	0.8	10	-
BM3	Air blast overpressure (dB(Lin Peak))	94.0	116.3	120	-
	Vibration (mm/s)	0.2	1.2	10	-
BM4	Air blast overpressure (dB(Lin Peak))	92.9	116.9	120	-
	Vibration (mm/s)	0.2	1.3	10	-

6.5.3 Blast Fume

Of the 112 blasts conducted there were no significant blast fume events greater then Level 3C (*Australian Explosives Industry & Safety Group* guideline). There were 32 blasts with fume recorded in 2023, ranging from 1A to 2B. All blasts were video recorded and categorised in line with the BLMP and relevant industry guidelines.

6.5.4 Proposed Improvement Measures

Continual refinement to blasting design, geological definition, and engagement with blasting product suppliers, shall occur during the next reporting period.

Figure 10: Blast Monitoring Network Location

6.6 Biodiversity

6.6.1 Environmental Management

Biodiversity was managed in accordance with:

- Schedule 3 Conditions 52 of the PA 10_0138; and
- the MCC Biodiversity Management Plan (BMP) and Biodiversity Offset Strategy (BOS) prepared to satisfy the requirements of PA 10_0138.

Various treatments were implemented during the reporting period to mitigate impacts of the MCCM including (but not limited to):

- weed monitoring and inspections;
- feral animal monitoring and inspections;
- seed management and collection;
- flora and fauna monitoring; and
- fuel load assessment.

6.6.2 Maules Creek Coal Mine (MCCM) – Biodiversity Offset Area (BOA) Management

MCCM Revised Biodiversity Management Plan (BMP) was approved by the former NSW DPE on 26 April 2017 and the Revised NSW Biodiversity Offset Strategy (BOS) was approved by former NSW DPE on 27 October 2015 to maintain and improve 12,169ha of native woodland and forest. Covering Offsets adjacent to MCCM, Leard Forest and Leard State Conservation Area; plus properties adjacent to the Boonalla Aboriginal Area and the largest group of properties to the west of Barraba bordering Mount Kaputar National Park. In 2021, Commonwealth DAWE approved the removal of Teston North, Tralee, Cattle Plain, Warriahdool, Olivedeen, Blue Range and Rocklea properties from the Commonwealth Offset Strategy as well as approving the MCCM Offset Management Plan on 20 December 2021. Further, Commonwealth DCCEEW approved the Additional Offsets of Triangle, Neranghi North, Coonoor, Long Gully and Thornfield in accordance with Condition 11A of EPBC 2010/5566 and that the overall Maules Creek BOS package (Existing and Additional Offsets) as achieving the requirements of Condition 9a & 9b on 9 November 2023.

Weather Summary of MCCM Offset Properties

The regionally central meteorological station to the MCCM Biodiversity Management Areas (BMA) is the Gunnedah Pool site (BOM 2024) which has recorded highly variable rainfall over the last five years; from driest in 140 years of 237mm in 2019, followed by above average rainfall years in 2020, 2021 and 2022 of 833mm, 990mm and 860mm resulting in numerous major flood events of the Namoi River. In 2023 496mm were recorded which is below average rainfall. MCCM maintains nine meteorological stations across the BMA with a summary of weather conditions experienced at Biodiversity properties during the 2023 reporting period:

- Roseglass - Maximum monthly average temperature was 35°C in January 2023. Minimum monthly average temperature was 9°C in July 2023. Annual temperature ranges were 4°C to 41°C in 2023. The total annual rainfall in 2023 was 434mm with the maximum in March (152mm) and minimum in May (0mm)
- Wirradale - Maximum monthly average temperature was 29°C in January 2023. Minimum monthly average temperature was 9°C in June 2023. Annual temperature ranges were 2°C to 34°C in 2023. The total annual rainfall in 2023 was 565mm with the maximum in December (123mm) and minimum in May (1mm)
- Wollandilly - Maximum monthly average temperature was 35°C in December 2023. Minimum monthly average temperature was 8°C in July 2023. Annual temperature ranges were 3°C to 40°C in 2023. The total annual rainfall in 2023 was 454mm with the maximum in March (135mm) and minimum in May (0mm)
- Teston South - Maximum monthly average temperature was 34°C in December 2023. Minimum monthly average temperature was 2°C in May 2023. Annual temperature ranges were -4°C to 41°C in 2023. The total annual rainfall in 2023 was 499mm with the maximum in March (132mm) and minimum in May (0mm)
- Kelso - Maximum monthly average temperature was 36°C in February 2023. Minimum monthly average temperature was 8°C in July 2023. Annual temperature ranges were 2°C to 41°C in 2023. The total annual rainfall in 2023 was 348mm with the maximum in December (87mm) and minimum in May (0mm)
- Triangle - Maximum monthly average temperature was 31°C in December 2023. Minimum monthly average temperature was 6°C in June 2023. Annual temperature ranges were 2°C to 36°C in 2023. The total annual rainfall in 2023 was 569mm with the maximum in March (166mm) and minimum in May (1mm)
- Long Gully - Maximum monthly average temperature was 30°C in January 2023. Minimum monthly average temperature was 4°C in July 2023. Annual temperature ranges were -1°C to 36°C in 2023. The total annual rainfall in 2023 was 731mm with the maximum in March (244mm) and minimum in September (3mm)

  Neranghi North - Maximum monthly average temperature was 31°C in January 2023. Minimum monthly average temperature was 8°C in July 2023. Annual temperature ranges were 2°C to 36°C in 2023. The total annual rainfall in 2023 was 689mm with the maximum in March (222mm) and minimum in May (5mm)

Offset Security Management

MCCM have successfully registered eight Conservation Agreements between 14 March 2020 and 2 June 2021 on the land titles of eleven Offset properties which are part of the Existing MCCM BOS. A further four Conservation Agreements were already secured for six properties outside of the BOS and another four

Conservation Agreements are on track to secure the additional offsets by 31 March 2024. The Existing Conservation Agreements were secured under Part 5 Division 3 of the Biodiversity Conservation Act 2016 and once the additional offset Conservation Agreements are registered they will complete the in perpetuity legal mechanism required by the Commonwealth EPBC Act Approval 2010/5566 Condition 13 & 13A and NSW Project Approval 10_0138 Schedule 3 Condition 54. WHC will reengage with NPWS that had previously shown interest in certain MCCM biodiversity properties being transferred to National Park Estate.

Infrastructure & Waste Management

During the reporting period, a total of 17.3km of new or repaired fencing (fauna friendly) was constructed along the perimeter of MCCM biodiversity properties (Roseglass, Kelso, Teston South, Teston North, Wollondilly, Mt Lindesay, Thornfield, Wirradale, Triangle, Neranghi North, Coonoor and Olivedeen) as well as maintenance of signage and gates was undertaken as required to continue to restrict unauthorised access and minimise livestock incursion. During the reporting period, 6.1km of redundant internal and external fences was removed on Velyama East, Louenville, Mt Lindsay and Coonoor properties. Any remaining derelict assets/infrastructure items will continue to be assessed, removed and remediated as required prior to potential transfer of MCCM biodiversity properties to National Park Estate.

Seed Management

The routine seed assessments for the MCCM BMA aims to identify on a seasonal basis the life cycle stage and development of native plants to identify what, where, when and how to target appropriate resources to collect seed for future revegetation programs. A total of ten species were collected resulting in 9.5kg of local provident seed from across the MCCM biodiversity properties. As part of the WHC group wide revegetation planning; the onsite collected seed was supplemented with commercially sourced local and regional provident seed by reputable seed collectors. A local revegetation provider was engaged to propagate the seed to produce Box Gum and non-EEC/CEEC Woodland overstorey species seedlings required for the completed 2023 revegetation program as well as planning for the 2024 revegetation program for the MCCM BMA.

Revegetation Management

The MCCM BMP revegetation strategy focuses on restoration and revegetation of cleared non-native grassland (former cultivation) and derived native grasslands and assisting natural regeneration in better quality woodland areas. During the reporting period, revegetation ground preparation was conducted through tractors and skidsteers auguring holes (to a depth >0.3m) to relieve compaction, improve permeability and infiltration to increase sub-surface soil moisture. For planting as part of planning the revegetation programs for 2023 on Onavale, Velyama West, Cattle Plain, Tralee, Ferndale, Ellerslie and Wollondilly biodiversity properties. WHC coordinated two revegetation programs during the reporting period consisting of an understorey revegetation (direct seeding) program and an overstorey planting program. The understorey revegetation was undertaken on Onavale between May and August 2023 with 210ha sown including 960kg of native grass seed (19 species), 120kg of native forb seed (8 species) and 3,720kg of bulking agent (calcipril). The overstorey revegetation

program was undertaken in May and August 2022 with 25,900 hiko seedlings of Box-Gum and other Woodland species planted over 331ha including the last of the new revegetation program on Onavale and continuation of maintenance revegetation programs on the Velyama West, Cattle Plain, Tralee, Ferndale, Ellerslie and Wollondilly biodiversity properties. The 254ha revegetated on Onavale during the reporting period was the final new revegetation area to be completed for the Maules Existing Offset Areas and therefore materially completes the active revegetation phase for MCCM BMA except for ongoing annual maintenance revegetation. Routine tree watering and maintenance activities post planting have successfully achieved 81% survival rate for the MCCM 2023 revegetation program which is commensurate with the target Woodland vegetation structure.

Heritage Management

During the reporting period, annual heritage inspections were completed on the 192 known Aboriginal archaeological heritage sites and 8 European historical heritage sites within the MCCM biodiversity properties. Each site is maintained with a total of 29.1km of demarcation fencing around all heritage site perimeters and signage to mitigate access and inadvertent disturbance. During this reporting period, 11 new Aboriginal archaeological heritage sites were identified on the Coonoor and Neranghi North properties. Further, 1.3km of new fencing or fence maintenance was carried out during 2023.

Habitat Management

During the reporting period, habitat augmentation was undertaken with 142 nest boxes targeted for Small Gliders, Greater Gliders, Microbats, Turquoise Parrots, Brown Treecreepers and Pale-headed Snakes installed on the biodiversity properties of Bimbooria, Roseglass, Wollandilly, Wirradale and Mt Lindesay. This brings the total nest boxes installed on the MCCM BMA to 464.

Weed Management

WHC coordinated routine formal weed monitoring/inspections undertaken across MCCM BMA in February, June, August and November 2023. The priority weeds identified included legacy weeds such as Buffel Grass, African Love Grass, Pattersons Curse, Marshmallow, Turnip, Fleabane, Common Thorn Apple, African Box Thorn, Prickly Pear, Green Cestrum, Bathurst Burr, Sweet Rose Briar, St John's Wort, Blackberry, Coolatai Grass and Johnson's Grass as well as a range of broadleaf weeds within revegetation areas. The weed monitoring/inspections ensure that timely and prioritised weed control is undertaken on a seasonal basis with the information directly given to spraying contractors to identify what, where, when and how to target appropriate resources across the MCCM BMA for weed control. During the reporting period, WHC implemented a comprehensive weed control program across the MCCM biodiversity properties including 869ha treated across Bimbooria, Roseglass, Cattle Plain, Ellerslie, Ferndale, Olivedeen, Kelso, Velyama West and East, Louenville, Teston North and South, Tralee, Thornfield, Wollandilly, Onavale, Wirradale, Wongala South, Mt Lindesay and Long Gully including spraying of fire break tracks. Only appropriately qualified and experienced weed contractors (AQF3 accreditation or higher for use of herbicide) were engaged to undertake weed control works for WHC.

Pest Animal Management

Whitehaven aims to apply an even and consistent pest animal management effort by routinely scheduling a rolling monitoring and control program across MCCM BMA. This standardised approach can also be supplemented with periodic targeted programs that focus on specific areas with high pest animal detection, or, on species which have increasing rates of detection. Management programs are planned using data collected from grid based motion detection cameras, pest animal observations and the results of previous control programs. Monitoring demonstrated that certain animals like Eastern Grey Kangaroos and Feral Pigs were in high abundance all year. Hares are seasonally variable, generally scarce but in medium abundance on some properties. Foxes and Deer are seasonally variable but recorded in medium abundance on some properties. All other pest animal species recorded as scarce to low abundance levels across 2023. The pest animal monitoring ensures that timely and prioritised pest animal control is undertaken on a seasonal basis identifying what, where, when and how to target appropriate resources across the MCCM BMA for pest animal management. During the reporting period, WHC implemented a comprehensive pest animal control program across the MCCM biodiversity properties with routine 1080 canid pest ejectors plus Hoggone baiting and trapping programs for Feral Pigs undertaken throughout 2023. During the reporting period; the 1080 baiting program removed 590 Foxes and/or Wild Dogs from 1841 canid pest ejectors. The Feral Pig control programs resulted in 3528 baits taken from 7202 Hoggone trays deployed; with a further 196 Feral Pigs trapped in 121 traps set in 2023 across MCCM biodiversity properties. Night time open range shooting programs were implemented in conjunction with the other pest animal programs resulting in an additional 254 Goats, 13 Rabbits/Hares, 167 Feral Pigs, 4 Foxes, and 20 Deer being controlled in 2023. Feral Goat harvesting also continued during the reporting period with 425 Goats being captured. Only appropriately qualified and experienced pest animal contractors (appropriate pest animal management qualifications, NSW fire arm licence and pesticide accreditation where relevant) were engaged to undertake pest animal control works for WHC.

Soil & Erosion Management

Annual inspections were undertaken across the MCCM BMA to review appropriate erosion and sediment control measures required in accordance with the Blue Book (Managing Urban Stormwater: Soils and Construction Volume 1 (Landcom 2004)), including unsealed fire break tracks and associated drainage structures. Throughout the reporting period there was average rainfall, with a total of 104 observations recorded within the MCCM biodiversity properties with only ten locations requiring targeted additional track maintenance to mitigate further erosion and sedimentation. The remaining tracks/drainage structures are maintained during routine WHC Biodiversity fire break track maintenance program. There are also a number of legacy erosion sites that are subject to a separate annual inspection process. Through 2023, monitoring, remediation action and investigations commensurate to the risk were undertaken for five of the erosion sites identified within MCCM biodiversity properties.

Grazing Management

MCCM BMAs continued to be destocked with no strategic grazing occurring during the reporting period. There were 38 instances of stock incursion during the reporting period; with all stock being retrieved and the fences repaired as required. Stock incursions increased in 2023 as a result of the flood damage suffered in previous years.

Bushfire Management

In accordance with the BMP, annual fuel load monitoring was undertaken between September and November 2023 as part of planning and assessment of bushfire hazard and ecological burn program for 2024. Results indicate there are moderate to high overall fuel loads present across MCCM BMA's. During the reporting period, three bushfires (lightning and neighbour ignition); three woodland ecological burns and one other controlled burn occurred on Kelso, Long Gully, Neranghi North, Tralee, Wirradale and Wollandilly. Maintenance of 584 kilometres of fire trails to a zero fuel barrier standard was also conducted across the MCCM BMA. WHC maintains regular communications with both the Liverpool Range and Namoi-Gwydir Zone RFS to plan WHC BMA site ecological burn programs as well as maintain contact points in case of emergency. WHC holds a specialist firefighting contractor for emergency engagement during the fire season in case of the event of a bushfire on WHC BMAs.

Threatened Flora Fencing

During the reporting period, threatened flora inspections were completed on the 56 known threatened flora sites of Tylophora linearis, Pomaderris queenslandica, Thesium australe, Dichanthium setosum and Digitaria porrecta within the MCCM BMA. A total of 46.7km of demarcation fencing around all site perimeters are sign posted to mitigate access and inadvertent disturbance. During the reporting period, 441 metres of new demarcation fencing was installed extending the Pomaderris enclosures with additional translocation plantings on Kelso, Louenville, Teston South and Wollandilly biodiversity properties.

Tylophora linearis Management

In accordance with the BMP, Stages 1 (Root Architecture) to 4 (Seed Propagation) of the Tylophora linearis translocation program had previously been completed in 2014 and 2015, with the Growth Study ongoing in 2023. Monitoring has continued of the 77 Tylophora linearis seedlings transplanted within the Wollandilly biodiversity property during 2023 which were propagated from seed collected onsite at the MCCM in 2014. Although only a proportion of the translocated Tylophora linearis were observed to persist through the 2023 monitoring period, evidence showed that the established plants have formed a viable population. Quarterly inspections of the translocated population identified flowering material on a subset of established plants. Although no observations saw seed to be produced, no mature seed was observed in the natural populations previously identified at Wollandilly. The cross-pollination trial established in 2022 was continued in 2023, however no seed developed. Topsoil, which was assumed to contain Tylophora linearis seed, was relocated

from the MCCM in 2019 to the Teston South biodiversity property. No Tylophora has been observed in these translocation populations, and soil translocation is not seen to be a viable translocation strategy for Tylophora linearis based on these results.

Pomaderris queenslandica Management

In accordance with the BMP, Stages 1 (Root Architecture) to 4 (Seed Germination) of the Pomaderris queenslandica translocation program had previously been completed in 2015 and 2016. The program has since been restarted resulting in an additional 154 Pomaderris queenslandica being translocated adjacent to the existing enclosures within the Wollandilly biodiversity property in 2023. Monitoring of all Pomaderris queenslandica translocated between 2020 and 2023 has recorded an 89.7% survival rate, including flowering and seed production from these plants during 2023 with some mortality observed likely due to reduced rainfall. In 2020, topsoil containing Pomaderris queenslandica seed was relocated from the MCCM and stockpiled prior to being translocated to a dedicated area constructed with exclusion fencing. In 2022, this topsoil translocation was found to be a success, with 12 Pomaderris queenslandica observed in the stockpile area, all of which survived through the reporting period along with a further 134 individuals in the translocation area. The majority of Pomaderris queenslandica in the stockpile and translocation areas were observed to be flowering, indicating that soil relocation is a viable strategy for Pomaderris queenslandica translocation.

Monitoring Program

The 2023 ecological monitoring program of the Maules Creek BMA included winter bird surveys that were undertaken in July and August 2023 and annual spring flora monitoring of 115 plots across 16 vegetation zones (VZs), from September to November 2023. The fauna monitoring program included surveys at 130 bird survey sites, 37 echolocation sites, 39 passive acoustic recorder sites, five drone survey sites, 20 pitfall trapping survey sites and 30 active forage sites. During the winter bird surveys, three threatened species (Dusky Woodswallow, Little Lorikeet and Turquoise Parrot) were recorded. During flora monitoring, three VZs (VZ 10, VZ 40 and VZ 41) were recorded as meeting or exceeding completion criteria for all four biometrics. Native plant species richness (NPS) completion criteria were met or exceeded at 12 out of 16 VZs. Native overstorey cover (NOS) completion criteria were met or exceeded at seven out of 16 VZs. Native midstory cover (NMS) completion criteria was met or exceeded at seven out of 16 VZs.

Bird, microbat and vertebrate surveys were taken across a range of vegetation types. Data in relation to species richness, average species and range of species is summarised in Table 16 below.

Table 17: Biodiversity Fauna Monitoring by Habitat Type

Fauna	Woodland			Naturally Regenerating			Rehabilitation		
	Richness	Average	Range	Richness	Average	Range	Richness	Average	Range
Bird	97	15.12	20 (6-26)	101	13.83	20(5-25)	57	5.93	13(1-14)
Microbat	19	11.87	14(3-17)	15	11.1	10(5-15)	10	8	6(4-10)
Vertebrate (pitfall)	21	6.71	7(4-11)	16	5.6	4(3-7)	11	4.14	3(4-7)
Vertebrate (forage site)	23	4.9	5(3-8)	16	4	6(1-7)	8	1.75	4(0-4)

Audits and Reviews

The Maules Creek Independent Biodiversity Audit was completed on 11 August 2023, submitted to NSW DPE on 26 September 2023 and accepted on 22 November 2023 as satisfying NSW Project Approval 10_0138 Schedule 3 Condition 56. Confirming that for the Mine Rehabilitation, no additional management measures other than those identified in the RMP and BMP are recommended to improve rehabilitation outcomes and that the revegetation is progressing adequately towards the completion criteria. The Biodiversity Offset Strategy had no non-compliance identified and there was no Leard Forest Regional Biodiversity Strategy Review during the reporting period.

Pre-Clearing and Clearing Surveys

The 2023 clearing program occurred between February 15 and April 30 2023 and consisted of the clearance of a total of 29ha to facilitate the expansion of the mining pit area and improve heavy vehicle access roads.

The ecological works for the clearing program consisted of the following activities;

- Weed mapping
- Threatened flora surveys
- Fauna pre-clearance surveys
- Clearance supervision
- Post-felling re-inspections

Prior to the commencement of any clearing activities the limits of clearing were surveyed and marked with pegs and flagging tape.

The pre-clearance and clearance flora and fauna surveys were conducted in several stages, some of which were ongoing throughout the entire clearing period and others conducted in discrete phases.

Targeted threatened flora surveys were conducted prior to the clearing activities in conjunction with weed mapping surveys. All threatened flora identified were recorded and their locations mapped with hand held GPS units.

Fauna pre-clearance surveys were also conducted in the week prior to the clearing works, to minimise the risk of birds nesting between the time of the survey and the commencement of clearing. This process ensures the maximum possible wellbeing of native fauna within the clearing areas as outlined in the BMP. Fauna pre-clearance surveys consisted of identifying, marking and documenting suitable fauna habitat features. These features include significant rock outcrops and crevices, large boulders, nests and, in particular, trees bearing hollows which have the potential to support species such as bats, gliders, possums, reptiles and birds. All fauna pre-clearing teams were equipped with endoscopic cameras to enable the examination of hollows considered likely to contain fauna. Features identified as likely to support resident fauna were marked with a large "H" using fluorescent spray paint and flagging tape. Habitat features were recorded using hand held GPS units.

In addition to the identification and marking of likely habitat features, nocturnal spotlight surveys were conducted throughout the clearing area to identify hollows in use by resident fauna such as the Squirrel Glider (*Petaurus norfolcensis*) and microbats. These surveys were conducted from dusk until approximately two hours after sunset.

Vegetation clearance was conducted following a two stage process, as follows:

- Stage 1 - After an area has been suitably surveyed for fauna habitat features, grubbing dozers then remove all understory vegetation leaving the marked habitat features isolated. Following grubbing works, habitat items were allowed to stand overnight. This was to allow resident fauna the opportunity to self-relocate to adjacent undisturbed vegetation.
- Stage 2 - In the following days, felling machinery conducted the removal of the isolated habitat items under the supervision of an ecology team. Habitat trees were shaken by the clearing machinery prior to felling to encourage fauna which had not already vacated the tree to do so. Following approval from the ecologists, the habitat trees were felled as softly as possible. The ecology team then inspect the hollows and loose bark for resident fauna and rescue any that remain present.

Fauna was encountered throughout the 2023 clearance works, including species of mammals and reptiles. Threatened species under the Biodiversity Conservation Act 2016 (Formerly called the *Threatened Species Conservation* (TSC) Act 1995) and/or the *Environment Protection and Biodiversity Conservation* (EPBC) Act 1999 were also encountered.

The following threatened fauna species were encountered during 2023 clearing works:

- *Microchiroptera* (Microbats)
- Pale-headed Snake

6.6.3 Proposed Improvement Measures

A number of improvement measures are proposed for the next reporting period including:

- Follow up monitoring of revegetation and weed management works across the offset areas and associated adaptive management;

- Continued implementation and progression of research projects required under the EPBC approval (refer section 8.1.1.9) ;
- Continuation of propagation and translocation programs for *Tylophora linearis* and *Pomaderris queenslandica*; and
- Implement improvements from audit findings.

6.7 Aboriginal Cultural Heritage

6.7.1 Environmental Management

Aboriginal cultural heritage is managed in accordance with the Aboriginal Archaeology and Cultural Heritage Management Plan (AACHMP) which was prepared to satisfy Schedule 3 Condition 58 and the SOC detailed in the PA 10_0138. The AACHMP was revised in 2021 by Whincop Archaeology, and was approved by DPIE in August 2022. The BTM Aboriginal Heritage Conservation Strategy, which aims to manage Aboriginal cultural heritage values across the three Leard precinct coal mines and associated biodiversity offset areas, was approved in November 2017.

6.7.2 Environmental Performance

Annual Monitoring Program

The Annual Site Audit (the Audit) was undertaken on 12-13 September 2023 with two Registered Aboriginal Party (RAP) representatives accompanied by a qualified archaeologist. The Audit included an inspection of all extant previously identified Aboriginal cultural heritage sites within the approved project boundary of the MCCM; all sites located within the MCCM biodiversity offset areas are inspected as part of a broader biodiversity offsets annual inspection. The Audit assessed the condition of 60 extant sites including fencing, potential disturbance and photographic records. Any required fence maintenance identified during the audit was noted in the resulting 2023 Annual Site Audit report. All Aboriginal cultural heritage objects recovered from MCCM are stored securely at the Red Chief Local Aboriginal Land Council as part of an existing Care Agreement, which was approved in early 2018. In accordance with the Care Agreement, Red Chief LALC is responsible for a regular audit of the artefact archive.

Additional Monitoring / Inspection of Sensitive Heritage Areas

The main change to the revised (and now approved) MCCM AACHMP is an update of the methodology for archaeological inspection of clearance areas. As such, 32 hectares of the 2023 clearance areas were subject to archaeological inspection on 24-25 November 2022 and 11-13 January 2023. The annual clearance area also included inspection of the location of 36 proposed drill pads and associated access tracks. The archaeological field team consisted of two qualified archaeologists, and two Registered Aboriginal Parties. No new sites were identified during this process. The FY23 clearance area was investigated by the archaeological field team in

accordance with the procedure outlined in section 6.4.2 of the approved MCCM Aboriginal Archaeology and Cultural Heritage Management Plan [AACHMP]. This process included a visual inspection of the ground surface prior to disturbance, with any 'sensitive' landforms (as defined in the approved MCCM AACHMP) targeted for detailed inspection. Test excavations were undertaken within Leard SF AS7 (AHIMS 20-4-0881) due to the presence of medium artefact density in this area. A further 53 artefacts were collected from this site during the inspection, all of which were recovered from the ground surface (not from the Shovel test Pits). No new Aboriginal cultural heritage sites were identified during the FY23 annual clearance works. The FY24 clearance areas are scheduled to be inspected on 15-17 January 2024.

Archaeological Due Diligence Assessments

In addition to proposed annual clearance areas, several infrastructure projects were undertaken within 2023. In accordance with the MCCM AACHMP and industry best practice, any proposed ground disturbance was subject to an Aboriginal Due Diligence Assessment [ADDA] prior to commencement of works. The primary purpose of a Due Diligence Assessment is to ensure that no Aboriginal objects will be harmed by the proposed works. In March 2023, an ADDA was undertaken for the proposed decommissioning of ten existing dams in and around the MCCM. No Aboriginal objects were identified at any of the dam locations. Also in March 2023, an ADDA was completed for 22 soil testing trenches proposed along the southern bank of Back Creek. One new artefact was identified, which was avoided by the activity and has been registered on AHIMS (Warriahdool Grindstone – 20-4-1056). This ADDA was followed up in August 2023 with a second ADDA for an additional three soil testing locations along Back Creek; no new Aboriginal objects were identified during this second assessment. Finally, an ADDA was undertaken in September 2023 for a 720-metre-long power line alignment to connect the existing Roma bore with power. One new artefact was identified, which was avoided by the activity and has been registered on AHIMS (Roma IA1 – 20-4-1107).

Archaeological Salvage Report

All artefact sites identified within the MCCM disturbance area have been salvaged in previous reporting periods through a combination of surface collection, test excavation and open-area excavation. The MCCM Archaeological Salvage report is being prepared and will be completed in the near future.

Aboriginal Heritage Conservation Strategy (AHCS)

As mentioned above, the Aboriginal Heritage Conservation Strategy was approved by the DPIE in November 2017. In February 2020, the Cultural Values report was completed and endorsed by RAPs involved in the survey. The final draft report will be presented to the wider Aboriginal community at an 'On-Country' workshop event to be held on one of the Maules Creek offsets. This event, which was scheduled to occur in 2020/2021, was delayed due to the COVID-19 pandemic. The results of the Cultural Values survey will be presented to RAPs during a 2024 meeting, after which a report on the results of the AHCS works will be finalised.

Ongoing Consultation

In accordance with the AACHMP, meetings with RAPs are convened approximately every six months, although the newly approved AACHMP includes revision of this schedule to annual meetings. In accordance with the revised AACHMP, one RAP meeting was held during 2023, and was open to all RAPs; the meeting was held in person in Boggabri on 26 July 2023.

Management of Quinine Bush

Quinine Bush (Alstonia constricta) continues to be mapped across the project as part of the land pre-clearance surveys, with the aim of identifying opportunities for seed collection and propagation. Ecologists have also been trained on the identification of potential Aboriginal scarred trees during pre-clearance surveys.

6.7.3 Proposed Improvement Measures

In 2024, several aspects of cultural heritage work will continue, including the continued implementation of the MCCM Aboriginal Archaeology Cultural Heritage Management Plan (AACHMP). In particular, the AACHMP was updated to reflect the current status of Aboriginal sites, but also to develop an improved methodology for the inspection of annual clearance areas. The AACHMP, which was updated by Whincop Archaeology, reviewed by Whitehaven Coal, and approved by DPIE, was updated to replace the use of grader scrapes during clearance with a targeted inspection of the ground surface prior to disturbance. This main change to the clearance methodology within the AACHMP was proposed by RAPs during RAP consultation meetings. The intention was to remove the use of grader scrapes from the process, as it is considered both ineffective and unnecessarily arduous work. Instead, the ground surface of all Aboriginal cultural heritage sensitive areas will be inspected prior to land clearance works. The FY24 annual clearance inspections are scheduled to be undertaken 15-18 January 2024.

6.8 Historic Heritage

6.8.1 Environmental Management

Historic heritage is managed in accordance with Schedule 3 Condition 58 of PA 10_0138 and the Statement of Commitments included in Appendix 5 of PA 10_0138, as well as specific management measures contained within the Maules Creek Historic Heritage Management Plan (HHMP). The MCCM HHMP was revised in 2021/2022 and was approved by DPIE on 16 March 2022.

The original Historic Heritage Assessment undertaken as part of the EA identified five historic heritage sites within MCC owned land. In 2016, an assessment was undertaken to address the proposed realignment of a river water pipeline in proximity to two potential historic heritage sites (Harparary Site Complex), which were deemed to be of local significance and were subsequently added to the MCCM HHMP. The recently approved HHMP (March 2022) includes performance measures for the protection and management of seven historic heritage sites.

6.8.2 Environmental Performance

A site inspection of all known historic heritage sites within the vicinity of the Maules Creek Coal Mine was undertaken as per Section 4.3.1 of the HHMP to ensure protective fencing was installed and adequate, and to monitor the ingress of weeds at the seven historic heritage sites. The site inspection included an assessment of the structural integrity of Velyama Shearing Shed and headstones within the Velyama Burial Ground. All historic heritage sites were considered to be in a generally stable condition. A structural engineering report on the Velyama Shearing Shed identified several necessary repairs to the structure in order to maintain long-term structural integrity. These repairs are in the process of being undertaken at the Velyama Shearing Shed. The two trees immediately adjacent to this structure have been removed, as per advice from Whincop Archaeology (the dead tree was threatening to fall on the shed, while the live tree was actively pushing on the shed and causing structural issues).

As predicted in the EA, the mining activity has not directly impacted the historic heritage items, although the extreme deterioration and unsafe condition of the two Harparary Complex structures has resulted in the deliberate demolition of these buildings. While this has resulted in a partial loss of historic heritage value, each site maintains an intact archaeological record that retains historic heritage values of local significance (their significance is primarily associated with the historical and archaeological values associated with the archaeological deposits at the site). An asbestos clearance program was undertaken at the site of the two former Harparary structures; this activity was overseen and monitored by Whincop Archaeology to ensure minimal disturbance to the archaeological record.

The Warriahdool Hut is in a deteriorating condition due to natural weathering and insect activity. A report prepared by Whincop Archaeology has recommended that this structure be deliberately demolished to minimise impact to the underlying archaeological deposit; measured drawings and a photographic archive have already been compiled for this heritage site. The eastern faced of the hut has now completely collapsed.

6.8.3 Proposed Improvement Measures

Biennial monitoring of historic heritage sites will continue in 2024, with maintenance and weed control to be undertaken as required. The demolition of the derelict, collapsing structure at Warriahdool Hut will improve the safety of this site and will ensure its associated archaeological deposits can be effectively maintained. A restoration project aimed at repairing the structure of the Velyama Sheering Shed will continue in 2024.

6.9 Traffic

6.9.1 Environmental Management

Traffic impacts associated with the MCCM are managed in accordance with Schedule 3 Condition 59 to 66 of the PA 10_0138 and the Traffic Management Plan (TMP). Various management measures were implemented during the reporting period to mitigate the traffic impacts of the MCCM including:

- A code of conduct for drivers of heavy and light vehicles;
- Notification to contractors and staff regarding the driver code of conduct and to advise of any updated access arrangements;
- Nominated access routes for all vehicles travelling to and from the MCCM, reinforced by approved signage and quarterly audits;
- Provision of a shuttle bus service for employees to access site;
- Consideration of school bus pick up and drop off times when scheduling shift changeovers;
- Monitoring of traffic volumes, road safety inspections, quarterly auditing of approved access routes;
- Results for coal transport monitoring are made publicly available on the MCC website annually;
- Community feedback via MCCM community contact line, website request and email, as well as consultation with the Community Consultative Committee (CCC); and
- Consultation with the relevant authorities to obtain necessary permits prior to the movement of oversized loads on public roads.

6.9.2 Environmental Performance

MCC conducts an annual audit regarding local road access restrictions as described in the TMP. Over the course of the 2023 reporting period analysis of employee transport records demonstrates wage employees utilising the bus services ranged from 80.22% to 86.56%.

There was one complaint regarding traffic generated by the MCCM during the reporting period.

The utilisation of the Boggabri access road off the Kamilaroi Highway is the primary access for mine related traffic during the reporting period which assisted in reducing vehicle interactions of mine and public traffic on Therribri Road.

6.9.3 Proposed Improvement Measures

Annual audits of restricted roads, quarterly monitoring of traffic volumes to the site and responses to any community complaints will continue to be implemented during the next reporting period. Section 6 of the MCC Traffic Management Plan requires quarterly traffic surveys to be undertaken, these surveys assess operations, maintenance and CHPP wages employees that utilise the bus service. Results from these surveys are presented in Table 16 below.

Table 18: Traffic Survey Results

Period	Wages Employees Accessing Site During Survey Period	Wages Employees Utilising Bus	Bus Utilisation (%)
Q1	34468	27783	80.61
Q2	33829	27139	80.22
Q3	34857	28247	81.04
Q4	32580	28201	86.56

6.10 Waste Management

MCC aims to implement all reasonable and feasible measures to minimise waste and ensure it is appropriately stored, handled and disposed of. Waste materials at MCCM are managed in accordance with:

- Schedule 3 Condition 70 of PA 10_0138.
- Condition A1 & A3 of the EPL.
- The Materials Safety Management Plan (MSMP) & Pollution Incident Response Management Plan (PIRMP).
- The legal and strategic framework for managing wastes in NSW.

MCCM waste streams include general waste, hazardous waste and sewage, and are collected and disposed of at authorised waste disposal sites by a licenced contractor. Sewage waste from the CHPP office building is treated on site.

Any mineral waste material within the operation that is determined to be potentially acid forming (PAF) are placed (buried) in the OEA or within mined-out sections of the open cut and covered with non-acid generating material at a location to minimise further oxidation. Additional management measures are detailed in the approved MOP.

6.10.1 Environmental Performance

Inspections of waste management practices are carried out to ensure general, hydrocarbon and recyclable waste is segregated with waste stream data provided by the licenced contractors. During the reporting period general waste output increased by approximately 15% when compared with the previous reporting period.

A total of 749t of general waste and 192t of solid recyclable material was removed in the 2023 reporting period. Approximately 1509 kl of septic waste and 1365 kl of used oils were collected by a licenced contractor with the oils taken for recycling. Additionally, 92t of regulated waste and 7.9 kl of coolant was also removed from site.

Waste management was consistent with the relevant management details in the EA and there were no significant incidents relating to waste management practices during the reporting period.

6.10.2 Proposed Improvement Measures

MCC will continue to monitor and report waste streams on a regular basis to effectively manage waste generated by the operation of the MCCM.

MCC will continue to manage and check for potential PAF material and dispose of this material as per the requirements of the Forward Plan.

6.11 Hazardous Materials

6.11.1 Environmental Management

Hazardous materials at the MCCM are managed and disposed of in accordance with the relevant Australian standards. Any spillages of potentially hazardous materials are required to be reported immediately to determine the appropriate response.

6.11.2 Environmental Performance

No reportable or significant incidents involving hazardous materials occurred during the reporting period. Minor leaks and spills associated with plant maintenance and operation were managed on site. The PIRMP was not required to be activated for any significant reportable incidents relating to hazardous materials. This will continue to be managed during the next reporting period.

Explosives

No environmental incidents involving explosives handling or storage occurred during the reporting period.

6.11.3 Proposed Improvement Measures

Continued operation of a bioremediation area will occur during the next reporting period.

7 WATER MANAGEMENT

7.1 Surface Water Management

7.1.1 Environmental Management

The MCCM water management system aims to ensure there are no adverse impacts to water quality in the receiving environment through early detection of any potential hazards and developing appropriate corrective actions. Potential impacts to surface water quality are managed in accordance with:

- The surface water criteria prescribed under schedule 3 condition 36 to 40 of the PA 10_0138.
- EPL Conditions P1, L1, L2and M2.
- The MCC Water Management Plan (WMP) prepared to satisfy the requirements of the EPL and PA 10_0138.

During the reporting period various controls strategies were implemented to manage surface water quality including:

- Prior to disturbance of land, appropriate erosion and sediment controls were established.
- Maintenance of a number of sediment dams previously constructed to collect runoff from disturbed areas, which is then used for dust suppression or pumped to the mine water dam for re-use on site.

- A combination of temporary and permanent clean and dirty water drains have been established to divert runoff from undisturbed areas and collect runoff from disturbed areas.
- Additional erosion and sediment control measures have been used for other small disturbance areas including silt fences, rock checks and other measures as required.
- Any water collected within the open cut pits was contained and reused on-site.
- Maintaining an up-to-date water balance to ensure on-site water demands are satisfied whilst minimising offsite water impacts.
- Validation of the site water balance model.
- Regular sampling and inspections of the onsite and surrounding surface water system.

Surface water monitoring locations are illustrated in Figure 11, and a summary of the surface water quality findings from the reporting period is provided below.

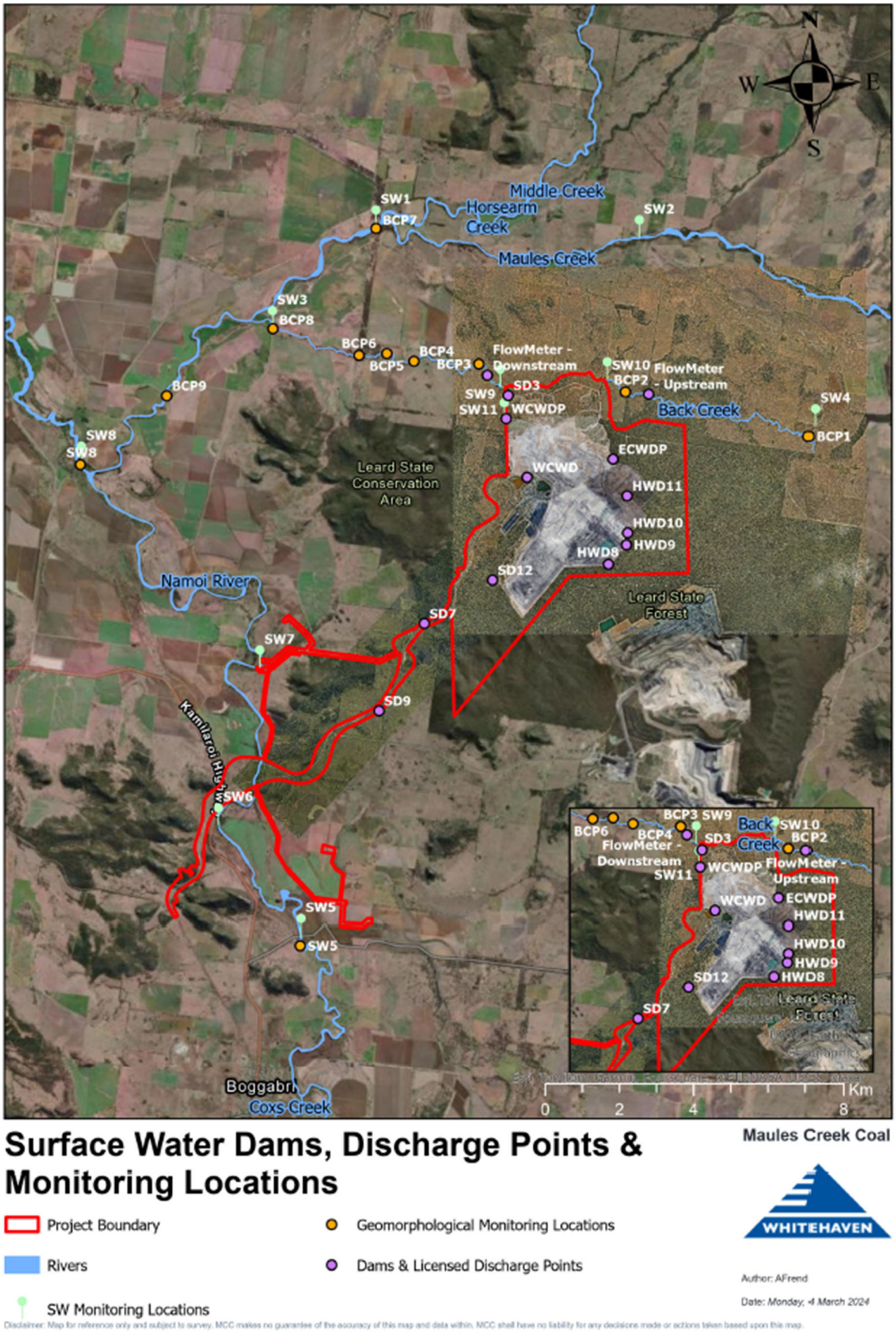

Figure 11: Surface Water Dams, Discharge Points and Monitoring Locations

7.1.2 Environmental Performance

Surface Water Quality

Routine surface water monitoring is conducted in surrounding watercourses on a monthly basis where the pH, EC, TSS and Oil and Grease monitoring results are detailed in Appendix D. Samples are collected consistent with Water Sampling Methods, AS/NZS5667.1 and AS/NZS 5667.6. All laboratory analysis is conducted by a NATA accredited laboratory. Laboratory pH in creeks and rivers surrounding the project are all trending generally within the ANZECC acceptable range for Irrigation, Ecosystem Health and Recreation. No community complaints were received during the reporting period in relation to surface water quality.

Overall, the surface water quality results recorded during the reporting period were generally consistent with historical trends recorded during baseline monitoring and previous years of operations at the MCCM. Additionally, the monitoring results are consistent with the EA prediction that the Project will not adversely affect surface water quality in downstream receiving waters. Water quality trends from 2019 are included in Appendix D and show that EC, TDS and TSS values fluctuate between wet and dry periods since commencement of monitoring.

Preliminary Trigger Values (PTVs) for twenty six key water quality parameters for Maules Creek, Back Creek and the Namoi River have been included in the WMP. Where insufficient data is available, ANZECC eco-system trigger values have been adopted (eleven parameters) in Appendix D. Trigger values have been developed using background data for fifteen parameters. The adopted trigger values will be refined as the operational stages of the MCCM proceeds. Monitored values above the PTV's are related to variable flow and upstream effects not attributable to the operation.

Onsite Water Quality

MCC monitors 'mine water' defined in the WMP as water that has come into contact with coal (e.g. groundwater inflows and surface runoff to the open cut pit or stormwater runoff from the ROM and product coal stockpiles). The water quality sampling of any 'mine water' conducted during the 2023 reporting period has been characterised as coal contact water and results shown are in Appendix D.

Flow

Throughout the reporting period, flow in the Namoi River has been largely dictated by natural flows following wet weather activities. Inflow pumping from the Namoi River did occur during the reporting period (8ML). This is attributed to the higher than average annual rainfall recorded in 2022 at the mine site providing an adequate supply of water for operational use.

Discharge Monitoring

Controlled discharge events occurred at MCC during the reporting period all of which were in compliance to the EPL and WMP. Controlled discharge events occurred from SD7 and HWD11. SD7 discharge events were a result

of the dam decommissioning project undertaken in the reporting period. And water from highwall dam 11 was discharged as water quality parameters met EPL requirements. Water samples were collected from the dams in accordance with the licence requirements. Water quality results for all discharge events are summarised in Appendix D.

Geomorphological Assessment

In December 2023, seven sites along Back Creek and Maules Creek had water and were sampled. Due to low water levels, nine sites were dry and therefore could not be sampled for water quality and macroinvertebrates. One site (BCP1) had a small pool of water and was sampled for water quality only, whilst all Namoi River sites were also sampled. The assessment included macroinvertebrate monitoring as well as physical and chemical monitoring in accordance with Australian River Assessment System (AusRivAS) guidelines as required in the Water Management Plan (WMP).

Macroinvertebrate communities differed between the three waterways sampled, but there was no significant difference between the control and impact sites. The significant difference in taxa richness between control and impact sites could be influenced by the lack of impact sites being sampled. The main factor driving macroinvertebrate community composition was the hydrological regime of each waterway. Flow in Maules Creek, although it had some fluctuations corresponding with rainfall events, did not experience the extreme high flows of Namoi River, nor the low flow and extended drying that occurred in Back Creek. Both flooding and drying constitute disturbances in river ecosystems, potentially reducing macroinvertebrate abundance and diversity. The more consistent flow in Maules Creek (compared to Back Creek), and continuous flow of the Namoi River explains why the invertebrate community appears to be in better ecological health there.

There was a significant difference between some of the physico-chemical variables measured at sites upstream and downstream of the mine. These differences are likely due to factors such as stream size, catchment, and the level of flow permanence. None of the impact sites along Back Creek had water in them when sampled, so the nearest downstream sites were all in the Namoi River. As there is no continuous flow between Back Creek and the Namoi, it is unlikely that MCCM will have had an impact downstream. Turbidity on the Namoi was higher at sites upstream of the Maules Creek confluence than it was downstream, suggesting that the addition of water from Maules Creek (where turbidity was much lower) may have diluted the sediment load of the Namoi slightly.

DO was low at all sites except for the two Namoi River sites downstream of Maules Creek (SW8 and NRDS1) and BCP1 in Back Creek. At BCP1, DO concentration exceeded the recommended ANZECC concentration. This site was a small, shallow pool where water is likely to have been turned over frequently by wind and so become over-saturated with DO. The two downstream Namoi River sites had DO concentrations within the preferred ANZECC range, likely because the water was flowing steadily at these sites, and the river was relatively shallow.

Historical agricultural practices have reduced the extent of the riparian zone to a narrow band of trees along Back Creek, Maules Creek, and the Namoi River at most sites. The composition of riparian vegetation is still mostly dominated by natives in the tree and shrub layer, and is occasionally connected to larger patches of vegetation, such as at TSRs. The groundcover layer was relatively healthy and has recovered from the drought following months of rainfall. There was no difference in RARC between upstream and downstream sites along Back Creek, where scores were relatively low at most sites.

Riparian vegetation and macroinvertebrate communities appear to be in moderate condition and have changed little since the previous sampling event in autumn 2023. The main influence on ecological communities appears to be the decreasing availability of water in Back Creek and Maules Creek, and lower, more consistent flow in the Namoi. Change in water levels from regular rainfall and frequent flooding in 2022 to decreasing water availability in 2023 has resulted in the drying of many sites. There is currently no indication of a direct impact from MCCM and it is unlikely that any indirect impacts would occur along Back Creek during the current dry period.

7.2 Groundwater

7.2.1 Environmental Management

Groundwater at MCCM is managed in accordance with:

- the groundwater criteria prescribed under schedule 3 conditions 36 to 40 of the PA 10_0138;
- EPL 20221 Conditions P1 and M2; and
- the MCCM WMP prepared to satisfy the requirements of the EPL and PA 10_0138. The WMP was updated in 2023 to align with ongoing development of the mine.

Currently groundwater monitoring is conducted on a network of regional bores and privately owned bores as illustrated in Figure 12.

The groundwater sampling sites on privately owned land are sampled biannually for depth to water and water quality. The regional bores are currently sampled monthly for depth to water and quarterly for water quality. Once the baseline groundwater quality of the regional bore network has been established, water quality monitoring will be conducted on a biannual basis as per the WMP. Bores are sampled in accordance with the Approved Water Sampling Methods and AS/NZS5667.11. All laboratory analysis is conducted by a NATA accredited laboratory.

In 2010, eight groundwater monitoring bores and four vibrating wire piezometers were constructed within former exploration holes (‘MAC’ bores) to collect pre-mining information as part of the Environmental Assessment (EA). All of these bores were progressively removed by mining or external activities, with the exception of one bore (MAC1280).

A replacement monitoring network was developed by MCCM in consultation with DPI-Water in 2013. The majority of the replacement bores were installed between 2013 and 2014. The replacement bores have the prefix 'RB' or 'BCM'. The two 'BCM' bores were installed along Back Creek to investigate the potential for a shallow water table to be present that could support vegetation occurring within the riparian zone along the drainage line. The progression of mining resulted in the removal of RB01, RB01A, RB02 and RB02A in 2017, and an alternative sampling location was identified, and continued to be sampled, pending amendment of the EPL.

A network of 17 additional monitoring bores and vibrating wire piezometers (VWPs) were proposed as part of the EA to monitor the cumulative impact of the BTM complex on the groundwater regime. The bores were also installed between 2013 and 2014 and positioned in lines radiating out from the Maules Creek Mine. The purpose of these sites was to monitor for depressurisation in the Permian strata and any potential water level drawdown within the surrounding alluvial aquifer.

The monitoring sites are either PVC monitoring bores (standpipes) for shallow strata, or arrays of multi-level VWPs installed within multiple coal seams at different depths. Paired VWP arrays with a shallow standpipe were installed in some sites to allow for monitoring of the connectivity between shallow aquifers and deeper coal seams. Where possible, the sites chosen were placed adjacent to existing shallow alluvial monitoring bores monitored by the NSW government to further assist in monitoring and understanding connectivity between the different geological units. These bores have the prefix 'REG' indicating they are for monitoring behaviour of 'regional' groundwater systems.

7.2.2 Environmental Performance

Parameters recorded as part of the scheduled groundwater monitoring for this reporting period are summarised below and results are provided in Appendix E. The appendix also includes graphs that compare the measured groundwater levels with predicted water levels from the 2020 groundwater model for each bore, in addition to presenting water level and water quality observations against triggers that were generally developed in accordance with the methodology proposed in the Water Management Plan.

Groundwater level trigger values were based on the 5th and 95th percentile values of all manual observations that were collected from regional monitoring bores until the end of 2016. Although observations between mid-2015 and the end of 2016 coincide with the preliminary period of operation, this data was included as baseline to establish a greater data set for analysis.

Groundwater quality trigger values were developed for Total Dissolved Solids (TDS) and sulfate using the control chart methodology. Control charts were also developed for total dissolved solids (TDS) but not for electrical conductivity (EC) as there are no ANZECC guideline values for EC. TDS is directly correlated with EC, allowing control charts developed for TDS to be used to evaluate changes in the salinity of groundwater.

When evaluating the results from control charts it is important to note that water chemistry results for each bore have some natural variability and are influenced by factors such as bore construction, sample depth, the sample collection method, climatic conditions, and aquifer conditions. Therefore, changes to previously observed trends do not necessarily indicate an impact from mining, but simply trigger further investigations to determine the cause of the variability.

The concentrations of dissolved metals and nutrients in groundwater samples were compared against the ANZECC (2000) and NHMRC (2011) guideline values. The concentrations of dissolved metals are commonly low and often fall below the level of laboratory detection. It is important to note that the adopted thresholds simply provide information on the beneficial uses of the water, and are not necessarily indicators of impacts from mining.

Regional Groundwater Bores

Rainfall was lower than average throughout the 2023 monitoring period with Cumulative Rainfall Departure (CRD) displaying a general decreasing trend. Declining water levels were observed at boreholes MAC1280, RB05a, Reg7a. RB05a has displayed a long-term declining trend. This bore is installed into the coal measures and declining water levels are attributed to continued depressurisation of this formation as mining progresses. A climatic influence was observed at MAC1280 and Reg7 with both bores displaying a significant increase in water levels towards the end of 2022. Then since have declined over the course of 2023 coinciding with lower rainfall. MAC1280 previously displayed a declining trend between 2018 and 2022, also considered to be associated with depressurisation of the coal formation. However, water levels showed significant recovery (±8 m) at the end of 2022. Water levels have since declined by 5.6 m between December 2022 and December 2023 which correlates with declining rainfall during this period. Similar can be said for water levels at Reg7a which have declined over 2023.

Rising water levels were observed at Reg12, Reg13, Reg 4, Reg5 and Reg6. The maximum change in water levels during this period (based on minimum and maximum values recorded) were moderately representative of seasonal fluctuations, ranging between 1.39 m (Reg13) and 2.96 m (Reg4). The trend data in these bores indicate a lag response to rainfall, most likely due to slow recharge to the volcanics. Limited data (June to December 2023) is available for newly drilled boreholes. The available data shows no significant change in water levels (typically <1 m) at almost all sites. Reg15 indicates a general decrease in water levels of <2 m.

pH is neutral and within the guidelines at most sites, with the exception of MAC1280 which has displayed consistently alkaline water quality probably due to cement grout used to seal the anulus of the borehole. Intermittent decreases in pH at this site, below the 5th percentile threshold, are rare but did occur in August 2023 (with a pH of 11.2). TDS concentrations were below the ANZECC guidelines at all monitoring boreholes. Sulphate concentrations were below the ANZECC guidelines at almost all boreholes, with the exception of Reg13. This site has historically displayed significant fluctuations in sulphate with an overall increasing trend. MAC1280 displayed a correlation between groundwater levels and water quality in 2023. As noted above, groundwater levels

increased significantly towards the end of 2022. This coincided with a decrease in pH and TDS and a significant increase in sulphate. These parameters then showed recovery towards baseline over the 2023 monitoring period.

Private Groundwater Bores

Most boreholes displayed no significant change in water levels throughout 2023, with stable water levels evident. Rising water level trends are observed at Tralee, Mors and Bre2. Tralee has indicated an increasing trend since 2020, with a significant increase observed between August 2022 and February 2023, rising by 3.6 m.
Bre2 and Morse have displayed a similar long-term increasing trend with water levels rising between February 2021 and August 2023. Water levels at Bas2 have fluctuated over time, with a general increasing trend observed since 2020. However current water levels are similar to historical data from 2014, suggesting a return to baseline.

Vibrating Wire Piezometers

The data collected by the VWP data loggers is downloaded on a monthly basis. The VWPs measure water pressure (equivalent to water level) within select coal seams and observations from sensors at different depths show groundwater level differences that occur vertically within the geological sequence. VWP water level variations demonstrate different trends that are often related to climatic conditions and/or mining.
The VWPs that are in close proximity to the active mining areas indicate that depressurisation is occurring as mining progresses, which is consistent with numerical modelling. Decreasing trends in certain coals seams that are monitored by REG01 (VW4), REG08, REG10, RB03, RB04, and RB05 were observed, which are consistent with long-term depressurisation that has been ongoing during mining activities, since the pit floor moved below the water table. Additionally, Boggabri Mine is progressing northwards towards Maules Creek Mine, and a cumulative impact is likely to be contributing to the observed depressurisation in the seams accessed by both mines. VWPs Reg1 (VW1 and VW2), Reg2, Reg7, Reg9 and Reg10 (VW1) showed no significant total change (generally ≤1 m) in water levels between end 2022 and end 2023. Groundwater levels in REG07 and REG09 have remained stable since the onset of monitoring, suggesting that mining induced depressurisation has not extended this far to the east/southeast.

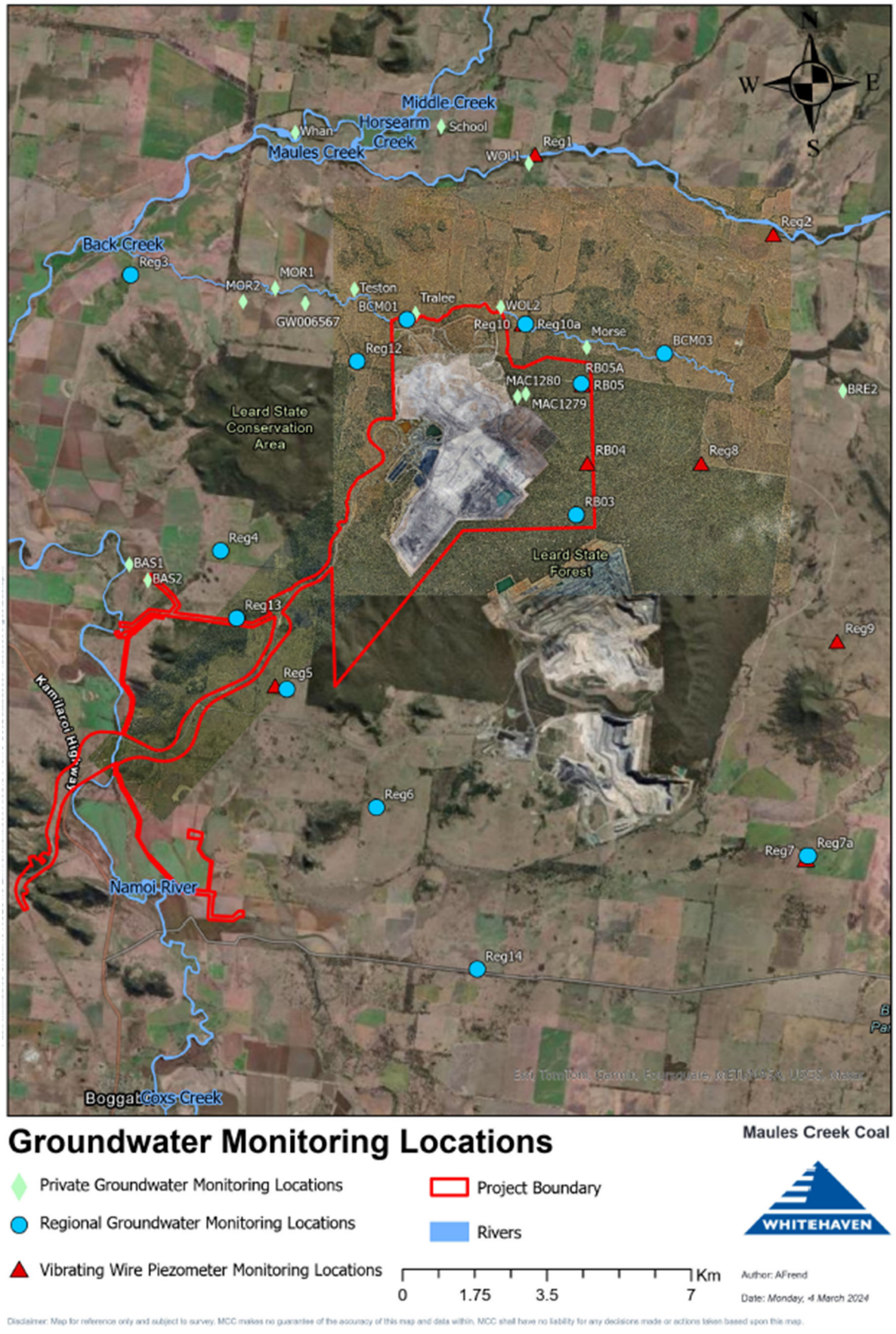

Figure 12: Groundwater Monitoring Locations

7.2.3 Trigger events

An analysis of trigger events as per the WMP was undertaken and the outcomes are provided in Table 19. A series of figures and tables that support these findings are provided in Appendix E.

Groundwater level trigger values were based on the 5th and 95th percentile values of all manual observations that were collected from regional monitoring and water supply bores until the end 2020 for most boreholes, as outlined in the updated WMP. Boreholes WOL2 and RB05a are exceptions to this, with the trigger values calculated from start of monitoring until 2018 and 2017, respectively. Groundwater levels are expected to exceed the 5th/95th percentile threshold in 10% of measurements, given that future fluctuations are representative of baseline conditions. This has been considered in the discussion on the trigger status in Table 19.

The following colour codes have been assigned to Table 19.

- Green shows no triggers occurred in 2023.
- Red shows that at least or more triggers occurred in 2023. This data is contextualised in terms of historical trends, climate trends, proximity to the mining operations and ANZECC guidelines.
- Black shows triggers with an associated action and response.

Table 19: Groundwater Trigger Events

Bore	Geology	TARP			
		Triggered?		Trigger / Significance / Source	Action and Response
MAC 1280	Permian	Level	No	No trigger.	No action, continue to monitor.
		pH	Yes	Climate controlled. Typically, within range.	No action, continue to monitor.
		TDS	Yes	Climate controlled. Typically, within range.	No action, continue to monitor.
		SO_4	Yes	Climate controlled. Typically, within range.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
RB05A	Merriown Seam	Level	Yes	Mine related drawdown. Consistent with decreasing water levels at VWP RB05. The drawdown curve matches the model simulated drawdown for this bore with predicted elevations matching the actual elevations at the end of 2023.	The groundwater elevation is within the predicted range of drawdown for this bore. The trigger for this bore should be changed to a model-based trigger.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	Increasing trend evident although typically in range. Most likely linked to decreasing water levels.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG12	Boggabri Volcanics	Level	Yes	Climate controlled. Mostly stable but shows good response to increased rainfall.	No action, continue to monitor.

		pH	Yes	Change from threshold is negligible.	No action, continue to monitor.
		TDS	Yes	Increasing trend evident although typically in range.	No action, continue to monitor.
		SO_4	Yes	One exceedance noted, typically within range.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG13	Boggabri Volcanics	Level	Yes	Climate controlled. Data indicates a lag response to rainfall.	No action, continue to monitor.
		pH	Yes	Data suggests that this bore is grout affected. The reducing values are likely representative of dilution over time towards actual pH conditions of the aquifer.	The percentile thresholds need to be recalculated using only the stabilised data.
		TDS	Yes	Likely a result of lower pH conditions which increases mineral solubility and mobilises more ions into solution.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG14	Basement	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	Yes	Change from threshold is negligible.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG3	Boggabri Volcanics	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	Yes	pH is consistently neutral, trend stable since 2020.	No action, continue to monitor.
		TDS	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		SO_4	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG4	Boggabri Volcanics	Level	Yes	Climate controlled. Good correlation with CRD trend, although a lag response is evident, possibly due to the depth of the screen (65.5 to 71.5m).	No action, continue to monitor.
		pH	Yes	pH is neutral and trend stable since 2018. Historical data fluctuated significantly, impacting the threshold calculation.	Review the trigger thresholds for this bore and the historical controls on water quality between 2014-2018.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	Yes	One exceedance noted, typically within range.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG5	Boggabri Volcanics	Level	Yes	No significant deviation from the typical range in 2023 (<0.21 m from 95th percentile threshold)	No action, continue to monitor.

		pH	No	No trigger.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG6	Boggabri Volcanics	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
REG 7A	Alluvium	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	Yes	pH is neutral and trend stable since 2020.	No action, continue to monitor.
		TDS	Yes	Increasing trend over time, consistently exceeding the threshold since 2020. Values currently well below ANZECC guideline.	No action, continue to monitor.
		SO_4	Yes	Recent data shows good correlation with CRD trend. Values return to threshold range in the 3rd and 4th quarter of 2023.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
GW967138_1	Alluvium	Level	No	No trigger.	No action, continue to monitor.
GW967138_2	Alluvium	Level	Yes	Climate controlled. Strong correlation with CRD trend.	No action, continue to monitor.
GW041027_1	Alluvium	Level	No	No trigger.	No action, continue to monitor.
GW030129_1	Alluvium	Level	Yes	Climate controlled. Strong correlation with CRD trend.	No action, continue to monitor.
BAS1	TBC	pH	Yes	Change from threshold is currently negligible. A reducing trend is evident, to be closely watched in future monitoring.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	Yes	Significant recent increase in sulphate however the change from threshold is negligible. To be closely watched in future monitoring.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No 2023 data	No trigger.	No action, continue to monitor.
BAS2	TBC	Level	Yes	Data is limited but appears to correlate with CRD trend.	No action, continue to monitor.
BRE2	Hard rock	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.

		pH	Yes	pH has fluctuated significantly but indicates a return to baseline.	No action, continue to monitor.
		TDS	Yes	TDS decreased significantly at the start of 2022. The trend has since shown a return to baseline. Water quality at this site is typically saline but is up- gradient of the site, suggesting a secondary source.	No action, continue to monitor.
		SO_4	Yes	Sulphate concentrations have fluctuated but remained well below the ANZECC guideline.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No 2023 data	No trigger.	No action, continue to monitor.
GW006567	TBC	Level	Yes	Water levels have increased by 0.7 m since 2015. Recent data correlates with increased rainfall trends.	No action, continue to monitor.
		pH	Yes	Limited data, so the percentile thresholds may not be representative, concentrations are within ANZECC guidelines.	No action, continue to monitor.
		TDS	Yes	Limited data, so the percentile thresholds may not be representative, concentrations are well below ANZECC guideline.	No action, continue to monitor.
		SO_4	Yes	Limited data, so the percentile thresholds may not be representative, concentrations are well below ANZECC guideline.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No 2023 data	No trigger.	No action, continue to monitor.
MOR1	TBC	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	Yes	Climate controlled. Trend correlates with CRD trend.	No action, continue to monitor.
		TDS	Yes	Climate controlled. Trend correlates with CRD trend.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
MOR2	TBC	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	Climate controlled. Trend correlates with CRD trend. Values well below ANZECC guideline.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	-	Value not provided by laboratory.	To confirm reporting requirements with laboratory.
		Metals	No	No trigger.	No action, continue to monitor.

MorseGW 1869	Sand stone	Level	Yes	Climate controlled. Mostly stable but shows good response to increased rainfall.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	TDS typically within range, only one exceedance in 2023.	No action, continue to monitor.
		SO_4	No	No trigger.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
School	Gravel	pH	No	No trigger.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	Yes	Sulphate below 5th percentile at <1 mg/l in 2023. Risk is low.	No action, continue to monitor.
		Ionic	-	Value not provided by laboratory.	To confirm reporting requirements with laboratory.
		Metals	No	No trigger.	No action, continue to monitor.
Tes ton	Hard rock	Level	Yes	Climate controlled. Data indicates a lag response to rainfall.	The percentile thresholds need to be recalculated using only the stabilised data.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	Decreasing trend evident, correlating with increasing water levels.	No action, continue to monitor.
		SO_4	Yes	Trend stable since 2016, with values typically low at <30mg/l.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
Tralee	Basalt	Level	Yes	Climate controlled. Mostly stable but shows good response to increased rainfall.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	Anomalous increase in February 2023 correlates with high water levels. May be rainfall related. Future data will confirm.	No action, continue to monitor.
		SO_4	Yes	Anomalous increase in February 2023 correlates with high water levels. May be rainfall related. Future data will confirm.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
Whan	TBC	Level	No	No trigger.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	No	No trigger.	No action, continue to monitor.
		SO_4	Yes	Sulphate below 5th percentile at 3 mg/l in August 2023. Risk is low.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
WOL1	TBC	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
		pH	No	No trigger.	No action, continue to monitor.
		TDS	Yes	General increasing trend evident however values are well below ANZECC guideline.	No action, continue to monitor.

		SO_4	Yes	Recent increase in sulphate observed however values are very low at ≤53 mg/l.	No action, continue to monitor.
		Ionic	No	No trigger.	No action, continue to monitor.
		Metals	No	No trigger.	No action, continue to monitor.
Roma Windmill	Alluvium	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
Roma MB	Alluvium	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.
Brighton Bore 3	Alluvium	Level	Yes	Climate controlled. Good correlation with CRD trend.	No action, continue to monitor.

The findings of the above TARP analysis were applied to the performance measure criteria outlined in the WMP. It was found that all sites applicable to the performance measures criteria showed no impact attributable to mining. Boreholes BCM01, BCM03 and Reg5a have been dry throughout the historical monitoring record and no data is available for comparison at these sites. The 2023 water quality data shows no exceedances of the ANZECC guidelines for pH, TDS or sulphate. Based on these criteria, the site is considered to be compliant with the Aquifer Interference Policy requirements.

7.2.4 Groundwater Inflows

Annual site water balance estimates (WRM, 2024) of groundwater inflows that report to the mining area against the modelled inflows predicted (AGE, 2022) show a significant increase in inflow between 2017 and 2018, as a result of deepening of the pit below the regional water table. Groundwater inflows decreased between 2019 and 2022, but recent data for 2023 has shown an increase in groundwater inflows. As mining progresses, groundwater inflows are predicted to vary with the changing mine layout, depending on the interception of porous rock water sources and the area of the mine being developed. As mining has progressed groundwater seepage estimates have been revised when operational plans change. A comparison of the 2023 groundwater inflows (WRM, 2024), of 548 ML, against the predicted inflow of 1079 ML (AGE, 2022), shows that the predicted estimates are approximately double that of the site water balance model. It is important to note that estimates for the numerical groundwater models represent groundwater removed by pumping, water that evaporates from the highwall, and water bound with coal and spoil. In contrast the water balance method only estimates the volume of water that flows into the mine water circuit. Both methods are therefore not directly comparable due to differing underlying assumptions.

7.2.5 Validation of Groundwater Model

As required by Schedule 3, condition 40 (c) of PA10_0138, a review of the measured groundwater monitoring results against predictions made within the 2014 groundwater model was undertaken by AGE. This review commenced in 2016 as part of a wider review of groundwater processes occurring in the Maules Creek area. The validation/verification process involved comparing:

- measured groundwater levels and trends in the monitoring bore and vibrating wire piezometer (VWP) network with the model predictions; and
- estimates of pit inflow from site water balances with model predictions.

The validation of the groundwater model will be reported every three years commencing August 2024

7.2.6 Proposed Improvement Measures

The groundwater monitoring program and management measures described above will continue to be implemented during the next reporting period.

Triggers for the following monitoring sites should be recalculated:

- RB05a triggers should be changed to model-based triggers as the model predicts drawdown at this site. As such, this bore will consistently exceed any percentile threshold-based triggers.
- The triggers for Reg13, Reg4 and Teston should be revised to account for stabilising conditions.
- The data shows that the current model does not accurately predict drawdown within the Braymont seam, notably at Reg8 VW1. The Tier 1 and 2 triggers for this site will be recalculated during the next model calibration in August 2024.

7.3 Water Supply

Table 20: Water Take For the 2022-2023 Water Year

Passive Take Licenses						
Water Licence #	**Water Sharing Plan**	**Water Source and Management Zone**	**Share Units (ML)**	**Available Water (ML)**	**Passive Take (ML)**	**Usage (ML)**
WAL 27385	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam to Gin's Leap) Groundwater Source	38	76	119	32
WAL 12613			50	100		42
WAL 36548			36	72		30
WAL12491		Upper Namoi Zone 11 Maules Creek Groundwater Source	77	77	4	3
WAL29467	NSW Murray Darling Basin Porous Rock Groundwater Sources	Gunnedah - Oxley Basin Mdb Groundwater Source	306	382.5	956	217
WAL29588			0	0		0
WAL36641			800	1,000		566
License Extraction Points						
Water Licence #	**Water Sharing Plan**	**Water Source and Management Zone**	**Share Units (ML)**	**Available Units (ML)**	**Active Pumping (ML)**	**Usage (ML)**
WAL12718	Upper and Lower Namoi Groundwater Sources 2003	Upper Namoi Zone 4 Namoi Valley (Keepit Dam To Gin's Leap) Groundwater Source	102	204	25.4	25.4
WAL12722			77	154	0	0
WAL12811		Upper Namoi Zone 5 Namoi Valley (Gin's Leap to Narrabri) Groundwater Source	135	270	0.4	2.9

WAL12479		Upper Namoi Zone 11 Maules Creek Groundwater Source	78	156	Not assigned to any works approval.	
WAL27383			0	0		
WAL12480			215	430		
WAL41585	Maules Creek Water Source	Maules Creek Tributaries Management Zone	30	30	0	0
WAL13050	Upper Namoi and Lower Namoi Regulated River Water Source	Lower Namoi Regulated River Water Source (High Security)	3,000	3,000	0	0

7.4 Site Water Balance

A review of the water balance found that inflows to the site during the reporting period were higher than the predictions made in the EA for Year 10 of MCCM operations. Although rainfall and runoff (1,456 ML) was not to dissimilar to the predictions in the EA for Year 10 (1,103 ML, respectively). Actual Namoi River pumping inflow (8 ML) was much lower than predicted in the Year 10 (1,860 ML, respectively).

CHPP water supply (3,774 ML) is higher than the predicted 10 year EA, this is potentially due to the differences between the predicted and actual proportion of ROM coal that is bypassed therefore increasing wash time. Despite this the net CHPP usage for 2023 remains similar to 2022 (1068ML to 882 ML respectively).

Dust suppression usage (1,333 ML) was significantly higher than predicted in the EA for Year 10 (453 ML) and a slight increase on 2022. This is due to active management measures in place to minimise potential dust emissions from haul roads and other exposed areas during the reporting period amplified by the increasing dry weather.

Estimated in-pit groundwater inflows (548 ML) is higher than the predictions in the EA for Year 10 (350 ML). Over the last 3 reporting years notable groundwater inflow was observed in the operation. This is likely to be attributed to the mining sequence progressing deeper within the stratigraphy, resulting in increased groundwater inflow from the coal seams. The site water balance for the reporting period is presented below in Table 21: Site Water Balance (Calendar Year 2023).

Table 21: Site Water Balance (Calendar Year 2023)

Aspect	Volume (ML)
Change in Storage	
Start of 2023[1]	2,311
End of 2023[1]	1,278
Net Change in Storage	1,028
Water Inflows	
Namoi River Pumping	8
MAC1498 Bore	0
Olivedene Bore	0
Brighton Bore	0
Roma Bore	0
BCM Bore	0
Rainfall & runoff^	1,456
CHPP Water Recycling	2,706
In-pit Groundwater Seepage	548
Total Inflows	4,717
Water Outflows	
CHPP water supply	3,774
Dust suppression	1,333
Evaporation from storages[3]	563
Clearing / construction process water	73
Offsite discharge	0
Licence Discharge	2[3]
Total Outflows	5,745
Water Balance (2023)	1,028

1 Includes recorded volumes in RWD and MWD1&2, as well as estimated volumes in sediment dams, highwall dams and pits
2 For a balanced system, this value should equal the "net change in storage"
3 Includes metered HWD discharges/releases

8 REHABILITATION

The Rehabilitation Strategy for MCCM is described in Section 7.16 of the EA. State and Commonwealth approvals both specify that the rehabilitation of MCCM must be consistent with the Rehabilitation Strategy Condition 71 of Schedule 3 of PA 10_0138 and Condition 26 of EPBC 2010/5566. The MOP summarises the key elements of the Rehabilitation Strategy and a description of activities and mine landforms. The rehabilitation area will be returned to a mixture of native vegetation communities including grassy woodland, shrubby woodland/open forest and riparian forest natural forest and woodland. Below, Table 22 summarises the rehabilitation objectives.

Table 22: Rehabilitation Objectives

Feature	Objective
Mine site	• Safe, stable and non-polluting • Constructed landforms drain to the natural environment
Final void	• Minimise the size and depth of the final void as far as is reasonable and feasible • Minimise the drainage catchment of the final void as far as is reasonable and feasible
Surface Infrastructure	• To be decommissioned and removed, unless the Executive Director Mineral Resources agrees otherwise
All land, other than the final void	• Restore ecosystem function, including maintaining or establishing self-sustaining ecosystems comprised of: o Local native plant species; and o A landform consistent with the surrounding environment, in accordance with the Revised Biodiversity Offset Strategy and the BMP (I.e. Conditions 45 and 53 of Schedule 3 of PA 10_0138 respectively).
Community	• Ensure public safety • Minimise the adverse socio-economic effects associated with mine closure

8.1 Rehabilitation Performance

At the completion of the reporting period, all domains were classed as 'active' with 21 ha of rehabilitation being prepared for final landform across the Northern Overburden Emplacement Area including shaping to final landform, topsoiling and seeding of native grasses. In preparation for planting of tube stock seedlings. Table 23 summarises the rehabilitation status for the MCCM for CY22, 23 and 24.

Table 23: Rehabilitation Status

Mine Area Type	2022 (Actual)	2023 (Actual)	2024 (Forecast)
A. Total mine footprint (ha)	1,790	1,820	1,820
B. Total active disturbance (ha)	1,514	1,523	1,498
C. Land being prepared for rehabilitation (ha)	40	21	25
D. Land under active rehabilitation (ha)	275	296	321
E. Completed rehabilitation (ha)	-	-	-

Decommissioning and Demolition Activities

As anticipated in the MOP, no decommissioning activities of permanent infrastructure was undertaken during the reporting period.

Other Rehabilitation Activities

There were no other rehabilitation activities in the reporting period.

Departmental Sign-off of Rehabilitation Areas

Departmental sign-off has not been requested.

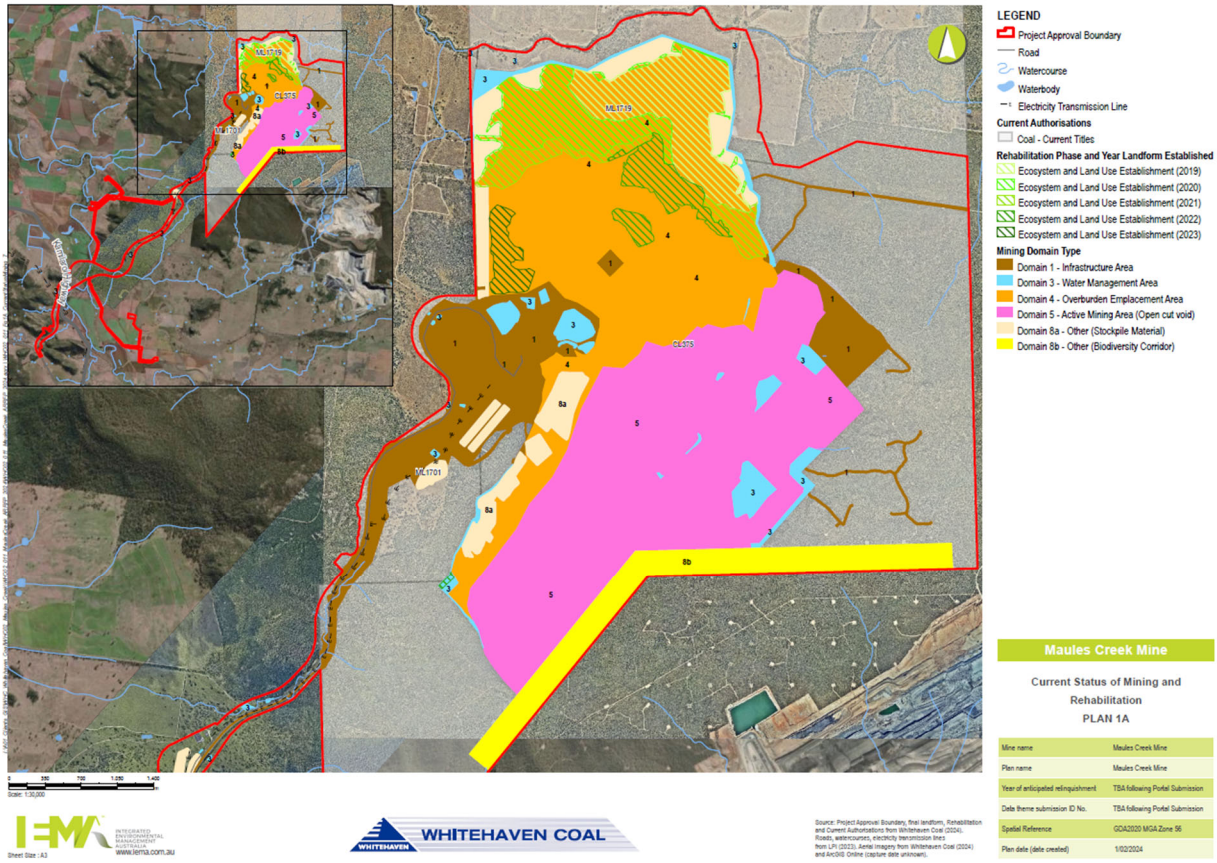

Figure 13: Mining and Rehabilitation Year 1 – FY23

8.2 Monitoring

Greenfields Agricultural and Environmental Services (Greenfields) was commissioned by Maules Creek Coal Mine to undertake the annual rehabilitation monitoring for 2023. In accordance with the MCCM Mine Operations Plan (Mod 8), Mine Site Rehabilitation Plan (2016), EPBC 2010/5566. On ground monitoring was undertaken by Benn Knott, Senior Ecologist with Greenfields on the 23rd to the 25th of November 2023. Monitoring of rehabilitation at the MCCM was undertaken to:

- evaluate the progress of rehabilitation areas towards meeting the rehabilitation performance indicators and completion criteria;
- determine the requirement for any maintenance and/or contingency measures (e.g. supplementary plantings, erosion control and weed control); and assess the success of MCCM rehabilitation methods/practices.

Fixed monitoring plots measuring 20 x 50 m were established at each rehabilitation and reference monitoring site. Within each plot, a 20 x 20 m quadrat were incorporated to assess floristic composition. The 20 x 20 m quadrat are sampled using a nested method (which segments the quadrat) as described by Morrison et al. (1995) and Lewis et al. (2008).

From monitoring conducted in 2023, a total of 176 species were identified within the 16 monitoring plots, including 117 native species and 59 exotic species. This is a reduction of 15 native species and 8 exotic species from the previous year.

Native species richness declined from the previous year's monitoring, with monitoring conducted in 2023 recording a total average of 17.25 species across all sites in comparison with 2022 recording a total average of 28.6. It is expected that as rehabilitation matures mid and overstorey densities will increase and the more dominant grass species will decrease diversity. Despite this though species richness at sites MR4 and MR5 did increase.

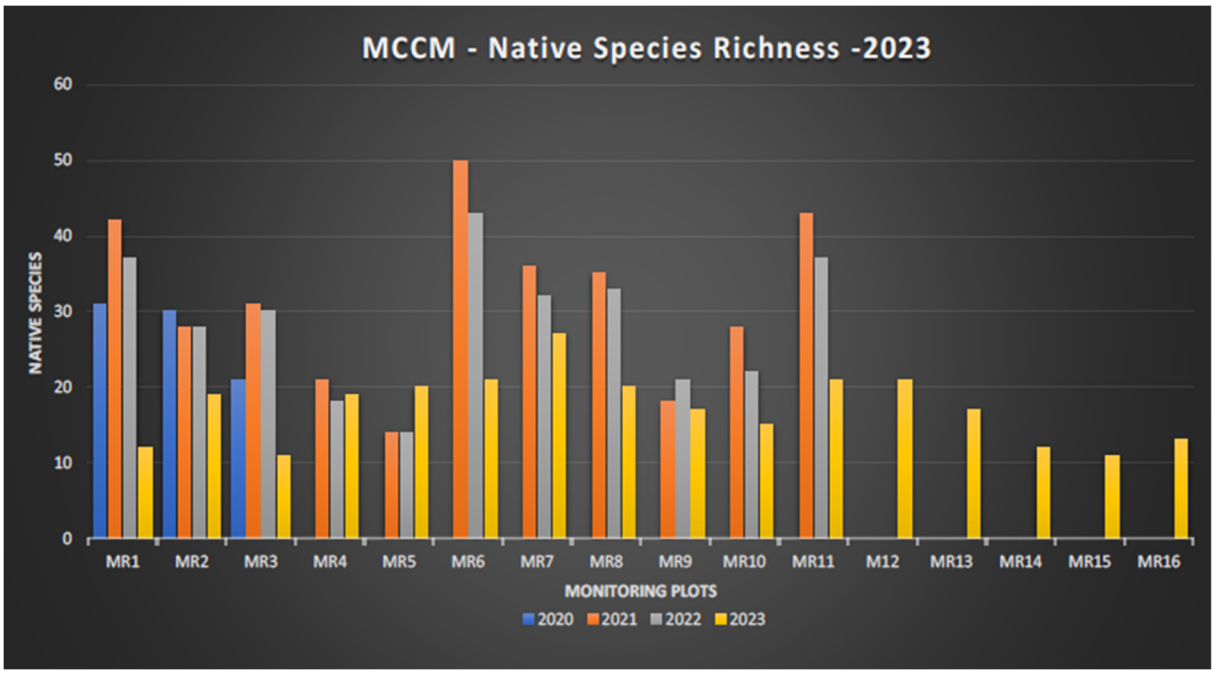

Figure 14: Native Species Richness (20 x 20 m plots) 2020-2023.

8.3 Topsoil Balance

During the reporting period topsoil and subsoils were stripped and stockpiled to address the objectives in the SHMP within the MOP. In line with Condition 39 of Schedule 3 of PA 10_0138, and Conditions 26(b), 27(c) and 27(d) of EPBC 2010/5566, the management of topsoil at the MCCM is undertaken in accordance with the Soil Management Protocol.

Detailed soil surveys have been undertaken within the disturbance footprint, prior to the stripping of topsoil. An independent consultant completed surveys assessing the suitability of topsoil and subsoil for use on mine rehabilitation. Topsoil volumes stored to date are summarised in Table 24 and MCCM will continue to monitor topsoil volumes to ensure appropriate volumes are recovered for later use on rehabilitation areas. A number of topsoil stockpiles may also require relocation during the following reporting period to enable progression of mining operations.

Table 24: Topsoil Balance 2023

Area	MIA / Construction	Mining Operations	Still to clear / strip	Totals	EA Total for rehab	Net difference
2014 Soil Balance (m^3)	539,166	252,490		**791,656**		
2015 Soil Balance (m^3)	145,990	349,928		**495,918**		
2016 Soil Balance (m^3)		852,524		**852,524**		
2017 Soil Balance (m^3)		762,718		**762,718**		
2018 Soil Balance (m^3)		251,075		**251,075**		
2019 Soil Balance (m^3)		225,173		**225,173**		
2020 Soil Balance (m^3)		127,086		**127,086**		
2021 Soil Balance (m3)		72,000		**72,000**		
2022 Soil Balance (m^3)		92,029		**92,029**		
2023 Soil Balance (m3)		178,670		**178,670**		
Total Soil Balance (m^3)	**685,156**	**3,163,693**	**381,909**	**4,230,757**	**2,368,000**	**1,862,757**

8.4 Trials, Research Projects and Initiatives

In accordance with Condition 15 & 16 of the MCCM EPBC Approval 2010/5566, MCC must fund $1 million into research of Box Gum Woodland mining rehabilitation as well as $1.5 million into research for threatened species recovery actions for the Regent Honeyeater, Swift Parrot and South-eastern (Corbens) Long-eared Bat. In accordance with approved Research Project Plans; Maules Creek Coal funded the following activities during 2023:

- The final funding was utilised to manage Swift Parrot mainland winter monitoring program, implementing new survey protocols to evaluate habitat use and movement patterns across south-east Australia;
- The final funding was utilised for targeted surveys of Regent Honeyeater; nest-protection measures and Noisy Miner management plus the coordination of range-wide volunteer surveys, newsletter and maintenance of sightings database and coordination and fieldwork for captive release program; and
- The final funding was utilised for critical habitat mapping and genetic testing across its entire range for the Corbens (formerly South-eastern) Long-eared Bat.

The findings of these research projects will be used to inform MCC on potential improvements to rehabilitation and restoration practices in particular during Box-Gum Woodland revegetation activities but also the management of threatened species both onsite and in the Offset Areas.

8.5 Key Issues to Achieving Successful Rehabilitation

The key issues to achieving successful rehabilitation at MCCM include:

- Excessive erosion (short term high intensity rainfall)
- Weed and feral animal infestation.
- Poor vegetation establishment and growth (including the Box-Gum Woodland EEC/CEEC).
- Landform instability.

In cases where rehabilitation performance is sub-optimal, additional management measures have been and will continue to be implemented (e.g. replanting, repairing landform and water management features, application of mulch/fertilisers, feral animal and weed control etc.). During the reporting period erosion repairs were undertaken to fill in minor riling's which formed due to major rain events in recent years. Since doing so ground covers have responded quickly and the repaired sections have fared well in the high intensity rain events which were experienced at the end of the reporting period.

8.6 Actions and Proposed Improvements

MCCM will continue to progressively shape available overburden dumps when final landform elevation is reached. Targeting the north-western extent of the overburden emplacement area to connect up to the already established north eastern rehabilitation area. During the next reporting period tube stock seedlings will be planted across the 2021, 2022 and 2023 rehabilitation areas.

9 COMMUNITY

Social impacts and opportunities associated with the MCCM are managed in accordance with the Social Impact Management Plan (SIMP), Schedule 3 Condition 78 and the Statement of Commitments (SoC) Appendix 5 of PA 10_0138.

9.1 Community Engagement Activities

MCC uses a wide variety of community engagement and consultation methods including:

- MCC Community Consultative Committee (CCC),
- Boggabri-Tarrawonga-Maules Creek (BTM) combined CCC,
- MCCM mine tours,
- local school visits including presentations to students and teachers in and out of schools,
- sponsorship and engagement with local community events and groups
- sponsorship and engagement with the Gunnedah, Narrabri, and Boggabri business chambers
- meetings as required with neighbours,
- meetings with a range of stakeholders including; government and non-government agencies,

- Whitehaven website
- MCCM phone hotline and dedicated email address, and local media updates

MCCM operates a Community Consultative Committee, with meetings held quarterly during the reporting period. In addition, a joint meeting between Maules Creek Coal, Boggabri Coal and Tarrawonga Coal Mines CCC's was held in May 2023. Minutes of these meetings are posted on the Whitehaven website once ratified at the following meeting.

MCCM is also involved in and attends various community events and information forums as part of engaging with the local Community including; Business Chamber forums, Council meetings, Industry forums, local School and Business functions, Community gatherings and Charities across four LGA areas.

9.2 Community Contributions & Initiatives

As well as attending functions, WHC and MCCM also contribute to the community by providing financial support and sponsorship to various community events and initiatives throughout the Community, these included:

- Australian Whip Crackers & Plaiters Association
- Black 'n' Blue Boxing
- Boggabri & District Rugby League Football Club Inc.
- Boggabri Community Church
- Boggabri Golf Club
- Boggabri Gunnedah Gun club
- Boggabri Public School
- Boggabri Rugby League Football Club
- Boggabri Women's Shed Inc
- Boggabri-Gunnedah Gun Club/Gunnedah Sporting Clays
- Boggy Ninja
- Cancer Council
- Carroll Community Bus Incorporated
- Cougar Warriors
- CrossFit Gunnedah
- Dorothea Mackellar Poetry Awards
- Eulah Creek Recreation Reserve Trust
- Gomeroi Allstars
- Gomeroi Roos
- Gunnedah Business Chamber
- Gunnedah Bulldogs AFL
- Gunnedah Can Assist
- Gunnedah Family & Children's Services Incorporated
- Gunnedah Filipino Australia Community
- Gunnedah High School
- Gunnedah Junior Rugby Club
- Gunnedah Meals on Wheels
- Gunnedah Ministers Fraternal
- Gunnedah PCYC
- Gunnedah Crime Prevention & Community Safety Conference
- Gunnedah Shire Council
- Gunnedah South Public School P&C Association
- Gunnedah Swimming
- Lil Achievers
- Lions Club of Gunnedah

- Maules Creek Campdraft and Junior Rodeo 2023
- Movember Foundation
- Multicultural Women's Association Inc
- Naidoc Week Committee Incorporated
- Namoi Women's Shed Incorporated
- Narrabri Business Chamber
- Narrabri & District Community Aid Service Incorporated
- Narrabri Arts Eisteddfod Inc
- Narrabri district junior rugby league club
- Narrabri Dolphins Water Polo Club Incorporated
- Narrabri High School
- Narrabri Industrial Network
- Narrabri Men's Shed Inc
- Narrabri RSL
- Narrabri Rugby League Football Club
- Narrabri Shire Community Radio Inc
- Narrabri Shire Council
- Nosh Narrabri Committee
- Plains of Plenty
- Presbyterian Social Service
- Rotary Club Gunnedah West
- Rotary Club Narrabri
- Salvation Army Gunnedah
- St Xaviers Narrabri
- The Combined Catholic Schools P&F
- Wean Amateur Picnic Race Club Inc.
- Wee Waa & District Historical Society Inc
- Wee Waa Local Aboriginal Land Council
- Wee Waa Community Band Inc.
- Wee Waa Show Society Inc.
- Clontarf Foundation
- Winanga-Li Aboriginal Child and Family Centre

The MCCM Social Impact Management Plan (SIMP) outlines a number of objectives to monitor the effect of the MCCM within the local community relating to housing, employment, training, economic development, community infrastructure and traffic. The following reports on the activities, monitoring and results with regards to the objectives outlined in the SIMP. The SIMP is currently in the process of being updated and has been sent to the Council's, Indigenous Representatives, Community Representatives and DPIE for review and comments.

Housing

To reduce the pressure on the local short term housing market, third party accommodation was supplied to contractors at the Civeo Accommodation Villages in predominantly Boggabri with some to Narrabri.

In addition, with the ramp up of mining employment this third party accommodation is also available to mine operations employees at a subsidised rate, to assist in reducing peak rental/leasing concerns in the local area. The fee for use, increases every three months in order to encourage employees to move into the local community permanently. Whitehaven has a strong focus on employing local people at its operations and this subsidised approach has been positively received as a short term housing solution by new employees to the mine as they investigate and look to relocate to the local area. WHC will continue to monitor in conjunction with local councils the ongoing housing and accommodation market to ensure impacts are managed. It is acknowledged the housing market is becoming tighter as more people move from the city to regional areas. In 2023, Whitehaven Coal commenced its first sub division project of 18 lots in Gunnedah. These lots will either be sold as vacant land or house and land packages to increase housing supply in the region. Whitehaven is looking at other options to continue improving housing supply in line with workforce numbers.

Employment and Training

As at the end of the reporting period, the total full time equivalent (FTE) Workforce was 828 personnel with 507 personnel employed with Whitehaven Coal and 321 personnel employed through labour hire contract partners. Whitehaven Coal continue to focus on local employment with 75% of MCCM employees residing in the Local Government Area's (LGA's) of Gunnedah and Narrabri (including Manilla). The remaining 25% of WHC MCCM employees (including management and professional staff) have permanent residence listed as being outside the Narrabri and Gunnedah LGAs.

During this period, MCCM recruited 127 permanent roles, of which 61 were local residents (48% of the new recruits; and 7% of the overall workforce). 36 new recruits were from the Gunnedah LGA (4.2% of the workforce); and 25 new recruits from the Narrabri LGA (3% of the workforce).

The associated transport solution of both residential and non–residential workforce is satisfied by the ongoing shuttle bus service that is provided by MCCM for both operational employees as well as staff/management where this is practicable.

Whitehaven's *Workforce Diversity Policy* promotes the strong representation of women, Indigenous and young people at MCCM. Of the MCCM workforce at the end of the 2023 period:

- 77 were Indigenous (WHC Employees)
- 79 were women (WHC Employees)
- 93 commenced roles as a trainee operators (new to mining).
- Whitehaven and MCCM provide training opportunities for apprenticeships in order to support local employment and increase local skill levels. During the reporting period four apprenticeships were accepted, this included three mobile plant mechanics and one electrician as part of the WHC MCCM apprenticeship program. This takes the total number of apprenticeships accepted under the program to 70, since 2011.

Provision of employment figures and amount of local spend by WHC is also available and provided to councils as requested to assist the councils in their forward planning, these figures are also included in financial reports released by WHC.

Economic Development

MCCM contributes financially to the economy at both state and federal level and to the communities in which we operate. Employees and contractors also add a significant economic contribution to the Gunnedah, Narrabri and Tamworth local government areas through their local expenditure.

In 2023 MCCM spent (on an equity joint venture basis):

- $254m in salaries, wages, taxes and superannuation to employees
- $158m in royalties to the New South Wales Government
- $223m in port and rail charges for track access haulage costs and port costs

Community Infrastructure

During the CY2023 period WHC spent approximately $357 million with regional businesses and suppliers in the Narrabri, Gunnedah, Tamworth and Liverpool Plains Shires. Local expenditure will remain a focus in future years.

9.3 Community Complaints

Whitehaven maintains a dedicated Community Hotline 1800 WHAVEN (1800 942836) for all sites including MCCM and is answered by an operator. The contact line continues to be advertised on the Whitehaven Coal website, MCCM CCC meeting and minutes, in Community Newsletters and newspaper advertising.

A summary of the complaints (by category) received by MCCM over the last two reporting years are detailed in Table 25. The Community Complaints Register is also available on the Whitehaven Coal website and a summary provided at CCC meetings.

Table 25: Summary of Community Complaints and Enquiries

Category	2022	2023
Air quality	0	0
Traffic	1	1
Lighting	0	0
Noise	0	1
Blasting	1	0
Social impacts	2	0
Other	0	1
TOTAL	4	3

Note: a single complaint may involve multiple categories.

9.4 Complaint Trends

The total number of complaints received in 2023 was lower than those recorded in the 2022 reporting period. There were no complaints in relation to air quality, lighting or blasting in the 2023, while there was one complaint for both traffic and noise.

9.5 Actions and Improvements

The three complaints were closed out and responded to in a timely manner. For the complaint in relation to noise, all monitoring data was compliant with licencing conditions. For the remaining complaints, MCCM communicated learnings and issues to operational personnel and processes were adjusted to mitigate reoccurrence.

10 INDEPENDENT AUDITS

10.1 Independent Environmental Audit 2021

The most recent IEA was undertaken in 2021 by an independent consultant approved by the DPI&E as required under Schedule 5, Condition 10 of the PA10_0138

A copy of the audit report and the action plan in response to the audit recommendations is available on the Whitehaven Coal website. These include recommendations that may have been relevant during the audit period however outside the applicable Annual Review reporting period. All actions were completed prior to this Annual Review period, or alternatively continued to be reviewed and applied as required (i.e. real time noise monitoring). The next IEA will be undertaken in 2024.

11 INCIDENTS AND NON-COMPLIANCES DURING THE REPORTING PERIOD

11.1 Non-Compliances

The compliance status of the MCCM against relevant approvals during the reporting period was assessed in Section 1 as of the end of the reporting period (31 December 2023). Further details of any actions undertaken or proposed for non-compliances, including within the following reporting period, are summarised in Table 26 .

Table 26: Non-Compliance Details and Proposed Action Plan

Non - Compliance	Date / Location	Cause	Action Plan	Estimated Completion Date
Schedule 3 Condition 12 a)	28/09/23 MCC CHPP	Individual fixed plant items located at the CHPP do not have the ability to be measured in isolation of the running plant. This has resulted in a Technical non-compliance of one piece of fixed plant whilst undertaking sound power testing. Overall site sound power level is compliant.	Continue maintenance program, testing and reporting	Complete

11.2 Reportable Incidents or Exceedances

Each type of incident or exceedance has been described in Table 4 of this report. All reportable non-compliances have been reported to the relevant agencies in line with the reporting process.

11.3 Regulatory Actions

During the reporting period no official cautions, warning letters or penalty notices were issued to MCC.

12 ACTIONS AND PROPOSED IMPROVEMENTS

Activities to be completed in the next reporting period to improve the environmental and community performance of the MCCM, in addition to those separately identified in Section 11 include. Implementing revised management plans, progressing overburden shaping and rehabilitation opportunities, undertaking research related projects regarding Box-Gum Grassy Woodlands, and continuing identification of community support opportunities.

APPENDIX A

Blast Monitoring Records

Blast Monitoring Records

The records presented in Table A-1 have been included to satisfy the blast reporting requirements of Schedule 3 Condition 19 and 20 of PA 10_0138.

Table A-1
Blast Monitoring Records

Date	Time	ID/Location	BM1 mm/s	BM1 dBL	BM2 mm/s	BM2 dBL	BM3 mm/s	BM3 dBL	BM4 mm/s	BM4 dBL
Exceedance Criteria (0% (5%))			10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)	10 (5)	120 (115)
3/01/2023	15:31	JER270-03-08-TS JEB295-04-09-TS-B	0.10	90.6	0.15	96.2	0.31	93.0	0.49	86.1
6/01/2023	12:28	MER07_07_37_OB HRN365_074_54_OB_D	0.04	94.0	0.06	104.4	0.06	90.2	0.07	100.8
10/01/2023	15:01	NAG270-04-10-PS JER_295_03_08_OB_E	0.05	91.0	0.09	95.5	0.11	102.8	0.10	92.5
11/01/2023	12:16	TSU08-46-OB	0.08	86.5	0.08	87.1	0.11	102.8	0.10	92.5
12/01/2023	10:38	JEB08-37-OB	0.09	87.0	0.12	101.2	0.15	101.1	0.23	91.0
14/01/2023	12:20	JEB 08-35-OB JEB 08-41-OB-B	0.07	90.2	0.10	91.2	0.11	92.3	0.17	83.1
20/01/2023	16:56	MER 08-38-OB JEB 07-45-PS	0.08	101.9	0.22	92.6	0.20	92.5	0.17	114.9
21/01/2023	15:35	JER270-04-09-TS NAG270-04-10-PS-B	0.17	104.9	0.21	92.4	0.59	100.9	0.81	96.6
25/01/2023	12:37	HRN 07-52-OB LRN 356-07-54-RL	0.08	92.1	0.07	106.9	0.13	96.9	0.11	86.1
30/01/2023	16:56	JEB 07-45-OB VEL 07-33-OB LRN 06-42-PS	0.08	95.1	0.15	101.5	0.14	106.4	0.14	99.1
3/02/2023	12:30	MER 07-39-OB	0.05	91.0	0.10	105.5	0.10	90.0	0.07	94.4
6/02/2023	15:43	JER270-04-10-TS JER310-03-04-TO NAG270-04-10-PS-C	0.05	87.6	0.06	92.1	0.15	91.8	0.36	87.6
9/02/2023	15:27	HRN07-53-OB	0.05	86.8	0.06	89.0	0.07	98.6	0.06	83.7
14/02/2023	10:22	LRN06-40-PS LRN06-42-OB	0.10	82.3	0.22	91.5	0.19	92.5	0.37	100.7
17/02/2023	12:17	JER295-02-01-PS 325-02-01-OB-A	0.30	86.7	0.42	97.1	0.63	93.9	0.85	95.2
18/02/2023	12:31	LRN06-40-OB VEL07-35-PS	0.07	84.9	0.14	104.0	0.16	93.4	0.27	91.1
20/02/2023	12:20	MER07-04-OB	0.04	79.5	0.08	87.2	0.09	92.6	0.07	83.3
22/02/2023	12:12	JER295-02-01-PS-B	0.25	93.2	0.27	104.9	0.44	98.7	0.37	116.9
24/02/2023	12:31	MER07_40_OB_B VEL07_35_OB	0.06	89.0	0.09	91.7	0.10	94.2	0.08	103.7
25/02/2023	12:21	JER04-06-TOE JER295-02-01-RL-A LRN270-04-07-PS	0.16	95.4	0.8	91.6	0.18	96.6	0.14	84.9
28/02/2023	12:24	LRN06-41-OB	0.10	79.5	0.15	104.9	0.19	108.1	0.22	100.4
9/03/2023	10:29	LRN270-04-07-TS	0.1	87	0.16	90.9	0.35	92.3	0.56	100.5

11/03/2023	15:28	MER07-41-OB NAG07-33-PS	0.05	77.9	0.13	81	0.12	88.4	0.12	86.9
18/03/2023	12:29	JER295-02-01-RL-B TSL07-46-OB	0.08	93.6	0.14	94.8	0.36	103.6	0.64	91.6
21/03/2023	12:33	NAG07-33-OB	0.1	100.7	0.2	98.5	0.19	106.4	0.21	107.8
24/03/2023	12:20	HRN356-07-55-OB HRN07-51-OB-C	0.11	92.3	0.07	96.5	0.1	89.9	0.08	83
25/03/2023	11:00	JEB 08-34-OB	0.12	100.1	0.18	94.6	0.17	91.6	0.27	106
1/04/2023	12:29	VEL07-40-OB	0.07	87.2	0.14	90.3	0.16	96	0.16	97.1
3/04/2023	12:49	BRL04-45-OB	0.03	101.5	0.09	82.8	0.09	94.7	0.06	98.5
6/04/2023	12:39	LRN270-04-03-TS JER295-03-01-RL	0.16	82.8	0.37	91.4	1.22	94.9	1.29	90.4
11/04/2023	12:32	TSL07-45-OB	0.01	85.7	0.02	97.4	0.03	83.6	0.02	92.5
12/04/2023	12:24	LRN-270-04-06-TS-RL JER-04-08-TOE JER-04-07-TOE	0.04	87.4	0.07	96.1	0.17	101.2	0.21	100
17/04/2023	14:35	JEB-08-40-PS VEL-07-37-OB	0.14	92.9	0.21	97.6	0.18	89.7	0.16	94.5
21/04/2023	12:36	TSM-08-46-PA HRN-366-08-52-RL	0.03	107.4	0.03	108	0.04	102.5	0.04	107
24/04/2023	10:51	LRN-270-03-06-RL	0.07	104.4	0.09	92	0.2	89.6	0.35	102.2
26/04/2023	12:24	JEB08-36-OB	0.15	94.1	0.19	92.1	0.18	98.2	0.32	92.4
28/04/2023	15:29	HRN 366-08-51-RL HRN 366-08-52-RL	0.05	83.5	0.05	89.5	0.06	89.2	0.06	82.5
3/05/2023	12:16	TNN06_45_OB ONV07_51_OB	0.07	96.9	0.09	99.8	0.12	89.6	0.09	91.4
3/05/2023	12:16	NAG07_33_OB_B	0.04	89.2	0.08	81.7	0.08	87	0.1	81.5
10/05/2023	14:14	TNN07-45-OB	0.04	87.7	0.06	91.2	0.08	96.9	0.06	85.5
12/05/2023	12:14	ONV07-49-OB HRN386-08-54-RL	0.08	101.3	0.09	99.3	0.1	98.9	0.08	89.6
22/05/2023	10:25	LRN270-04-06-TO JER270-03-03-TS	0.09	93.9	0.15	91.5	0.65	93.9	0.67	95.9
26/05/2023	13:36	BRT06-45-OB BRL 05-45-OB	0.06	107	0.1	108.8	0.16	105.5	0.15	101.1
29/05/2023	12:24	JER02-01-OB-A	0.03	86.8	0.05	92	0.1	92.5	0.12	91.2
1/06/2023	12:10	VEL07_42_OB	0.06	84.6	0.09	88.4	0.11	92.5	0.12	91
2/06/2023	14:06	JEA04_45_OB JEB04_45_PS	0.08	82.5	0.19	85.9	0.18	91.8	0.11	88.1
3/06/2023	12:08	NAG07_36_OBA	0.02	86	0.04	95.8	0.05	87.7	0.04	90.4
7/06/2023	12:34	TSL08_45_OB	0.03	80.5	0.05	86.7	0.06	88	0.05	85.4
9/06/2023	15:08	LRN270-04-06-TO	0.01	88.1	0.02	83.7	0.08	87	0.03	83.3
13/06/2023	12:23	BRL05_51_OB	0.05	83.5	0.07	85.1	0.12	91.2	0.12	97.7
14/06/2023	15:25	JER02_02_OB	0.19	85.3	0.27	99.8	0.51	89.5	1.04	89.7
19/06/2023	12:26	LRN07_32_OB_A MER07_43_OB	0.12	85.7	0.2	96.3	0.2	91.2	0.28	89.9
24/06/2023	10:16	NAG07-36-OB-B	0.04	80.8	0.07	78.4	0.06	89.8	0.05	87.7
26/06/2023	12:29	JER02_03_OB MER08_38_PS	0.16	88.5	0.16	87.4	0.34	89.9	0.63	92.8
29/06/2023	12:24	TSU07_50_OB	0.07	98.7	0.07	97.7	0.11	97.4	0.08	94

30/06/2023	12:11	JEB_08_38_OB	0.2	94.6	0.27	91.7	0.21	94.7	0.4	90.7
3/07/2023	12:19	TSU360_03_58_RL	0.04	97.2	0.04	95.1	0.06	99.5	0.08	104.6
4/07/2023	10:09	VEL07-43-OB-B	0.06	88.8	0.11	95	0.11	101.6	0.11	109.5
7/07/2023	12:12	JEB08-38-OB-B	0.08	93	0.09	103.4	0.08	88	0.15	92.9
10/07/2023	15:31	LRN06-36-OB NAG04-05-TS	0.05	96.9	0.15	93.4	0.21	97.9	0.21	92.3
12/07/2023	12:06	BRL05_45_OB_B	0.03	76	0.06	93.2	0.06	85.7	0.06	95.5
13/07/2023	12:13	JER07_33_OB_B JER02_03_TOE	0.06	93.2	0.09	96.2	0.09	94.5	0.12	94.9
18/07/2023	15:32	TSU07_52_OB TSL07_50_PS	0.11	90.2	0.11	102.5	0.19	93.8	0.16	89.6
24/07/2023	13:18	LRN07-40-CA LRN07-41-PS	0.16	102.7	0.41	117.4	0.31	116.3	0.58	104.6
25/07/2023	12:10	TSU330-06-60-RL	0.03	91.7	0.05	92.7	0.04	94.9	0.04	95.7
27/07/2023	12:21	NAG04-10-OB	0.06	83	0.06	95.4	0.11	92.8	0.18	86.9
31/07/2023	15:26	HRN366-08-33-RL	0.09	97.1	0.13	96	0.19	100.8	0.14	91.4
2/08/2023	12:20	NAG250-03-05-TS	0.06	92	0.11	97.2	0.23	98.3	0.39	96.4
7/08/2023	12:41	TNN08-47-OB	0.04	91.3	0.05	93.5	0.07	98.4	0.07	86.5
9/08/2023	12:11	JEB08-34-OB-B	0.01	85.3	0.02	95	0.02	84.7	0.02	82.7
14/08/2023	12:03	NAG250-04-09-PS	0.1	85.5	0.09	100.6	0.16	88.3	0.32	90.3
15/08/2023	12:21	LRN07-36-CA	0.2	92.6	0.37	96.2	0.5	104.4	0.8	96.7
16/08/2023	12:19	NAG02-01-OB	0.09	87.6	0.11	81.9	0.34	84.2	0.5	92
17/08/2023	12:41	BRL05-52-OB JEA05-45-OB	0.06	105.4	0.1	108.6	0.11	103.3	0.1	88.8
21/08/2023	12:22	BRT07-45-OB	0.06	89	0.12	92.5	0.14	90.2	0.11	85.9
24/08/2023	12:57 12:57	NAG250-04-08-TS NAG04-09-OB	0.10 0.09	89.9 98.6	0.13	90.7	0.18	90.2	0.28 0.34	92.5
25/08/2023	12:11	JEA04-48-PS	0.07	82.8	0.1	90.3	0.11	88.6	0.08	77.9
31/08/2023	13:00	LRN07-42-CA LRN07-41-PS-B LRN07-41-PS-C	0.29	92.3	0.6	103	0.4	95.6	0.51	90.1
5/09/2023	12:20	LRN07-43-OB	0.06	84.1	0.12	97.5	0.2	88.6	0.15	77.6
6/09/2023	12:20	JEA04-48-OB	0.09	82.5	0.14	96.3	0.15	91.6	0.16	89.2
8/09/2023	12:04	JEB08-38-TO	0.01	78.7	0.02	94.7	0.02	78.1	0.01	90
11/09/2023	16:53	BRL06-48-OB	0.05	94.7	0.08	94	0.11	90.6	0.13	98.2
13/09/2023	12:14	NAG02-07-OB-A	0.1	97.5	0.09	94	0.26	89.8	0.4	89.3
15/09/2023	15:58	LRN07-41-OB-A	0.1	91.5	0.24	91.6	0.31	95	0.3	93.3
19/09/2023	15:45	TSM07-50-PA BRT07-45-PS	0.09	93.5	0.11	109	0.19	103.1	0.27	96.4
23/09/2023	12:17	NAG250-03-09-TS	0.05	82.8	0.09	87	0.15	89	0.19	92.7
25/09/2023	15:42	JEB08-39-TOE	0.01	82.8	0.03	77.7	0.03	79.7	0.02	83.6
27/09/2023	12:12	LRN07-41-OB-B	0.09	83.7	0.31	101.7	0.24	96.6	0.21	91.1
4/10/2023	12:42	BRT04-46-OB BRL06-50-OB	0.1	91.4	0.15	104.9	0.15	101.4	0.14	94

5/10/2023	12:17	LRN07-41-OB-C	0.09	85.3	0.27	91.6	0.19	92.3	0.2	91.5
9/10/2023	12:02	NAG250-03-08-TS JER02-10-TO	0.04	80.2	0.08	91.5	0.14	90.4	0.16	89.9
12/10/2023	12:21	LRN07-41-OB-D JEB07-37-TO	0.11	92.6	0.21	104.3	0.24	101.9	0.27	101.4
16/10/2023	10:46	VEL02-04-PA	0.02	95.7	0.02	103.2	0.04	85.8	0.09	86.1
18/10/2023	12:24	LRN07-37-OB	0.1	99.9	0.21	94	0.32	99.7	0.37	105.9
20/10/2023	15:25	TSL07-50-PA	0:14	89.9	0.02	91.7	0.02	94	0.01	85.7
23/10/2023	15:22	LRN07-33-OB MER08-34-OB	0.22	95.8	0.36	108.3	0.52	97.8	0.51	95.4
30/10/2023	10:52	TSL330-03-61-RL NAG02-07-OB-B	0.1	92.1	0.16	93.6	0.15	95.4	0.27	100.5
3/11/2023	12:23	HRN360-04-06-RL	0.12	103.4	0.18	97.9	0.25	93.3	0.27	83
7/11/2023	12:21	VEL02-09-OB	0.01	99.3	0.03	102.5	0.04	89.5	0.12	91.3
9/11/2023	15:24	MER08-33-OB JEB04-50-PS BRT07-52-PS	0.08	84.6	0.13	102.7	0.22	97.5	0.17	85.8
13/11/2023	12:27	MER08-37-OB	0.13	81.4	0.18	84.1	0.16	88.1	0.18	93.1
17/11/2023	12:24	TNN07_49_OB	0.06	102.9	0.06	105.2	0.08	98.5	0.11	114.5
20/11/2023	12:14	JER03_05_PA	0.01	91	0.02	91.3	0.02	89.7	0.03	99.5
23/11/2023	12:45	JEA05-48-OB	0.05	90.8	0.08	87.2	0.12	87.1	0.07	89.5
2/12/2023	12:28	BRL04-46-OB	0.03	81.7	0.07	86.6	0.08	82.3	0.08	82.7
4/12/2023	12:09	NAG03_05_TS	0.02	83.7	0.04	92.5	0.06	83.3	0.1	103
7/12/2023	12:19	MER08_40_OB BRT08_45_OB	0.07	92.6	0.12	92.8	0.15	106	0.14	90.3
12/12/2023	12:32	HRN360_04_59_RL	0.12	102.8	0.15	99.2	0.21	94.3	0.2	92.9
15/12/2023	12:17	NAG03_06_OB	0.04	88.8	0.07	109	0.17	97.4	0.41	87.9
18/12/2023	15:22	BRL06-46-OB JEA05-45-OB-B LRN07-32-CO TSU330_03_58_RL	0.05	87.2	0.1	98.8	0.1	94.2	0.08	85.8
23/12/2023	14:44	NAG03-08-TS	0.04	81.1	0.06	79.9	0.09	84.7	0.13	87.6
30/12/2023	12:14	LRN07-42-TO	0.01	86.4	0.03	86.9	0.03	91.7	0.02	89.2

APPENDIX B

Coal Transport Records

Appendix B
Coal Transport Records

The records presented in Appendix B have been included to satisfy the coal transport reporting requirements of Condition 65 (a) and (b) of PA 10_0138. The amount of coal transported from the site on a monthly basis and the date and time of each rail movement generated by the MCCM has been listed in the Table B-1 and Table B-2 below.

Table B-1
Coal Transported Monthly

Month	Coal Transported (MT)
January	0.59
February	0.55
March	0.57
April	0.46
May	0.53
June	0.92
July	0.61
August	0.66
September	0.88
October	0.71
November	0.72
December	0.79
Total	8.01

Table B-2

Daily Train Movements

Date & Time of Load Completion			
1/01/2023 14:19	21/01/2023 3:25	4/02/2023 3:35	20/02/2023 4:35
1/01/2023 18:58	21/01/2023 7:24	4/02/2023 14:24	20/02/2023 16:43
1/01/2023 21:33	21/01/2023 13:29	4/02/2023 16:55	21/02/2023 0:35
2/01/2023 0:18	21/01/2023 23:29	5/02/2023 0:03	21/02/2023 10:25
2/01/2023 2:32	22/01/2023 7:24	5/02/2023 8:29	21/02/2023 19:04
2/01/2023 19:26	22/01/2023 9:58	5/02/2023 16:02	22/02/2023 1:56
3/01/2023 15:02	22/01/2023 14:03	5/02/2023 18:13	24/02/2023 15:40
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25/09/2023 10:20	11/10/2023 12:50	23/10/2023 1:08	5/11/2023 19:26
25/09/2023 14:44	11/10/2023 18:43	23/10/2023 5:45	6/11/2023 8:03

25/09/2023 20:35	11/10/2023 21:16	23/10/2023 9:20	6/11/2023 11:12
26/09/2023 0:54	12/10/2023 2:08	23/10/2023 17:22	7/11/2023 0:13
26/09/2023 3:38	12/10/2023 4:37	23/10/2023 22:00	7/11/2023 6:06
26/09/2023 13:20	13/10/2023 1:58	24/10/2023 7:21	7/11/2023 17:24
26/09/2023 20:58	13/10/2023 16:53	24/10/2023 10:39	8/11/2023 3:07
26/09/2023 23:59	13/10/2023 20:18	24/10/2023 19:13	9/11/2023 3:11
27/09/2023 3:42	13/10/2023 22:45	24/10/2023 22:19	9/11/2023 12:45
27/09/2023 7:33	14/10/2023 9:20	25/10/2023 0:35	9/11/2023 18:12
10/11/2023 3:40	25/11/2023 2:16	5/12/2023 0:11	18/12/2023 17:27
10/11/2023 8:30	25/11/2023 5:57	5/12/2023 5:23	18/12/2023 22:47
10/11/2023 10:54	25/11/2023 15:55	5/12/2023 8:25	19/12/2023 3:28
11/11/2023 0:50	25/11/2023 18:35	5/12/2023 11:33	19/12/2023 15:45
11/11/2023 4:41	26/11/2023 0:22	5/12/2023 15:48	20/12/2023 0:32
11/11/2023 21:16	26/11/2023 4:23	5/12/2023 18:41	20/12/2023 7:06
12/11/2023 1:04	26/11/2023 8:18	5/12/2023 21:53	20/12/2023 12:07
12/11/2023 6:04	26/11/2023 10:48	6/12/2023 1:49	20/12/2023 15:35
12/11/2023 11:19	26/11/2023 16:07	6/12/2023 5:29	20/12/2023 23:11
12/11/2023 15:51	27/11/2023 2:28	6/12/2023 17:13	21/12/2023 2:10
12/11/2023 18:22	27/11/2023 5:15	7/12/2023 6:59	21/12/2023 4:58
13/11/2023 0:23	27/11/2023 12:46	7/12/2023 10:22	21/12/2023 7:51
13/11/2023 5:38	27/11/2023 17:22	8/12/2023 4:59	21/12/2023 11:21
13/11/2023 8:45	28/11/2023 0:23	8/12/2023 9:26	21/12/2023 18:22
13/11/2023 14:15	28/11/2023 4:57	8/12/2023 15:35	22/12/2023 3:15
13/11/2023 18:04	28/11/2023 8:28	8/12/2023 19:00	22/12/2023 7:59
14/11/2023 6:48	28/11/2023 10:44	9/12/2023 2:52	22/12/2023 11:10
14/11/2023 12:33	28/11/2023 16:56	9/12/2023 9:07	23/12/2023 4:25
14/11/2023 16:08	28/11/2023 21:40	9/12/2023 14:37	23/12/2023 9:16
15/11/2023 1:56	29/11/2023 0:05	9/12/2023 23:52	23/12/2023 17:53
15/11/2023 6:18	29/11/2023 3:48	10/12/2023 13:21	24/12/2023 1:16
15/11/2023 11:38	29/11/2023 8:26	10/12/2023 19:09	24/12/2023 10:02
15/11/2023 20:07	29/11/2023 14:09	10/12/2023 23:26	26/12/2023 23:11
16/11/2023 8:23	30/11/2023 10:59	11/12/2023 1:36	27/12/2023 4:45
16/11/2023 12:40	30/11/2023 14:39	11/12/2023 4:03	27/12/2023 14:38
16/11/2023 20:29	30/11/2023 17:27	11/12/2023 18:40	27/12/2023 17:40
17/11/2023 4:20	30/11/2023 20:56	12/12/2023 3:06	27/12/2023 21:16
17/11/2023 6:52	1/12/2023 5:49	12/12/2023 10:39	28/12/2023 5:56
17/11/2023 9:46	1/12/2023 16:09	12/12/2023 20:16	28/12/2023 8:35
17/11/2023 19:33	1/12/2023 20:48	13/12/2023 1:48	28/12/2023 11:17
17/11/2023 22:45	1/12/2023 23:46	14/12/2023 0:41	28/12/2023 14:16
18/11/2023 3:18	2/12/2023 4:36	14/12/2023 5:42	28/12/2023 19:22
18/11/2023 6:13	2/12/2023 9:19	14/12/2023 8:39	29/12/2023 0:06
18/11/2023 13:13	2/12/2023 15:16	14/12/2023 16:06	29/12/2023 11:37
18/11/2023 16:21	3/12/2023 0:42	15/12/2023 14:18	29/12/2023 15:30
18/11/2023 21:10	3/12/2023 4:43	16/12/2023 0:16	29/12/2023 19:23
19/11/2023 0:26	3/12/2023 8:42	16/12/2023 4:44	30/12/2023 0:59
19/11/2023 3:40	3/12/2023 16:41	16/12/2023 21:46	30/12/2023 10:00
19/11/2023 16:21	3/12/2023 20:51	17/12/2023 1:11	30/12/2023 14:34
19/11/2023 21:03	4/12/2023 2:53	17/12/2023 5:43	31/12/2023 0:51
20/11/2023 5:00	4/12/2023 5:47	17/12/2023 17:00	31/12/2023 2:58
20/11/2023 7:43	4/12/2023 10:38	18/12/2023 1:15	31/12/2023 6:16
24/11/2023 23:04	4/12/2023 14:02	18/12/2023 8:52	

APPENDIX C

Annual Sound Power Testing

Table C-1

Sound Power Level Testing Results

Plant ID	Model	EA Model		2023	
		Lw	Lw(A)	Lw	Lw(A)
TRACKED BULLDOZERS					
DOZ301	D10	129	127	124	122
DOZ351	D475A	129	127	121	117
1091	D10	129	127	126	123
WHEEL LOADERS					
WLO430	WA1200	122	115	116	113
WLO812	WA1200	122	115	115	112
DRILLS					
DGR452	MD6290	122	118	120	118
DRG454	MD6290	122	118	118	117
DRG455	MD6290	122	118	119	117
EXCAVATORS					
EXC222	3600	131	119	120	114
EXC224	3600	131	119	119	114
EXC263	8000	131	119	122	116
EXC264	8000	131	119	121	117
1105	Hit. 22.5T	131	119	115	111
WATERCARTS					
WAT502	CAT777D	122	115	119	115
WAT807	CAT773	122	115	117	113
REAR DUMP TRUCKS					
RDT001	EH5000	124	117	121	116
RDT006	EH5000	124	117	123	117
RDT007	EH5000	124	117	121	116
RDT008	EH5000	124	117	121	115
RDT009	EH5000	124	117	121	116
RDT012	EH5000	124	117	123	117
RDT014	EH5000	124	117	121	116
RDT015	EH5000	124	117	122	116
RDT016	EH5000	124	117	121	115
RDT018	EH5000	124	117	124	117
RDT024	EH5000	124	117	122	116
RDT027	EH5000	124	117	123	116
RDT029	EH5000	124	117	122	115
RDT030	EH5000	124	117	121	115
RDT033	EH5000	124	117	122	116
RDT034	EH5000	124	117	123	116
RDT036	EH5000	124	117	123	116
RDT037	EH5000	124	117	121	115
RDT041	EH5000	124	117	121	115
RDT044	EH5000	124	117	122	115
RDT051	EH3500	124	117	120	115
RDT055	EH3500	124	117	121	116
RDT101	789D	124	117	122	115
RDT102	789D	124	117	122	116
RDT883	789C	124	117	121	115
RDT888	789C	124	117	123	116

RDT889	789C	124	117	124	116
RDT890	789C	124	117	122	116
RDT891	789C	124	117	121	115
RDT892	789C	124	117	122	115
STATIONARY PLANT					
Coal Preparation Plant		133	117	130	115
Conveyors (200m section)		113	108	107	102
Conveyors (500m section)		117	112	110	105
Primary ROM sizer		117	109	113	106
Secondary ROM sizer		121	112	118	111
Product Stacker		111	104	105	95
Product Reclaimer		122	115	111	101
Raw Coal Transfer Station		117	103	114	105
CPP product Transfer Station		117	103	115	103
Train Loadout		114	103	N/A	N/A

APPENDIX D

Surface Water

Appendix D

Surface Water

The surface water monitoring results for the reporting period are detailed in the table below.

Table D-1

Location	Date	pH Value	Electrical Conductivity @ 25°C	Total Dissolved Solids (TDS)	Suspended Solids (SS)	Turbidity	Total Alkalinity as CaCO3	Calcium (filt.)	Magnesium (filt.)	Sodium (filt.)	Potassium (filt.)	Aluminium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Manganese (total)	Nickel (total)	Selenium (total)	Silver (total)	Zinc (total)	Boron (total)	Iron (Total)	Arsenious Acis, As (III)	Arsenic Acid As (V)	Mercury	Nitrite + Nitrate as N	Total Nitrogen	Total Phosphorus as P	Total Anions	Total Cations
		pH Unit	µS/cm	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L
SW1	17/01/2023	7.53	447	286	6	6	153	36	13	38	2	0.37	<0.0001	<0.001	<0.001	<0.001	0.05	<0.001		<0.001	<0.005	<0.05	0.25	<0.5	0.8	<0.0001	0.19	0.4	0.14	4.64	4.57
	15/02/2023	7.51	450	270	6	4.4	155	40	14	38	2	0.13	<0.0001	<0.001	<0.001	<0.001	0.049	<0.001	<0.01	<0.001	<0.005	<0.05	0.34	<0.5	1.1	<0.0001	0.28	0.5	0.13	4.77	4.85
	17/03/2023	7.52	445	324	6	3.6	157	39	15	43	2	0.22	<0.0001	<0.001	<0.001	<0.001	0.045	<0.001	<0.01	<0.001	<0.005	<0.05	0.42	<0.5	1	<0.0001	0.1	0.3	0.14	4.87	5.1
	14/04/2023	7.53	452	296	<5	4.5	154	35	15	41	2	0.13	<0.0001	<0.001	<0.001	<0.001	0.038	<0.001	<0.01	<0.001	<0.005	<0.05	0.32	<0.5	0.9	<0.0001	0.17	0.2	0.14	4.75	4.82
	16/05/2023	7.66	466	288	<5	1.3	166	42	14	39	2	0.04	<0.0001	<0.001	<0.001	<0.001	0.027	<0.001	<0.01	<0.001	<0.005	<0.05	0.18	<0.5	0.9	<0.0001	0.16	0.3	0.11	5.1	5
	15/06/2023	7.9	471	252	<5	2.6	157	38	14	38	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.027	<0.001	<0.01	<0.001	<0.005	<0.05	0.23	<0.5	1	<0.0001	0.15	0.2	0.1	4.91	4.73
	14/07/2023	7.56	465	283	<5	1.6	148	34	12	39	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.027	<0.001	<0.01	<0.001	<0.005	<0.05	0.2	<0.5	0.9	<0.0001	0.13	0.3	0.14	4.69	4.41
	14/08/2023	7.55	448	301	<5	2	147	38	14	38	2	0.1	<0.0001	<0.001	<0.001	<0.001	0.029	<0.001	<0.01	<0.001	<0.005	<0.05	0.29	<0.5	0.7	<0.0001	0.1	0.4	0.12	4.88	4.75
	14/09/2023	7.38	406	259	<5	1.1	134	34	13	33	1	0.04	<0.0001	<0.001	<0.001	<0.001	0.027	<0.001	<0.01	<0.001	<0.005	<0.05	0.18	<0.5	0.8	<0.0001	0.05	<0.1	0.14	4.02	4.23
	12/10/2023	7.47	360	248	<5	2.6	132	34	13	31	2	0.04	<0.0001	<0.001	<0.001	<0.001	0.038	<0.001	<0.01	<0.001	<0.005	<0.05	0.24	<0.5	0.6	<0.0001	0.74	1	0.1	3.92	4.17
	6/11/2023	7.54	352	220	<5	1.8	131	23	10	29	1	0.13	<0.0001	<0.001	<0.001	<0.001	0.048	<0.001	<0.01	<0.001	0.009	<0.05	0.33	<0.5	0.6	<0.0001	0.02	0.1	0.11	3.68	3.26
	13/12/2023	7.3	349	226	<5	3.6	134	31	12	31	2	0.06	<0.0001	<0.001	<0.001	<0.001	0.076	0.001	<0.01	<0.001	<0.005	<0.05	0.44			<0.0001	0.01	<0.1	0.14	3.63	3.93
SW2	17/01/2023	7.5	493	302	<5	0.3	178	46	16	35	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.007	<0.001		<0.001	0.005	<0.05	<0.05	<0.5	1.1	<0.0001	0.86	1.1	0.06	5.28	5.16
	15/02/2023	7.54	527	318	<5	1.2	180	45	17	40	1	0.06	<0.0001	<0.001	<0.001	<0.001	0.008	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.2	<0.0001	1.6	1.8	0.07	5.41	0.75
	17/03/2023	7.52	522	392	<5	0.7	184	52	18	39	1	0.03	<0.0001	<0.001	<0.001	<0.001	0.004	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.1	<0.0001	1.81	2.1	0.07	5.67	5.8

	14/04/2023	7.45	501	298	5	1.4	176	44	16	31	1	0.02	<0.0001	<0.001	<0.001	<0.001	0.006	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.2	<0.0001	1.38	1.6	0.14	5.24	4.89
	16/05/2023	7.56	534	320	<5	0.7	195	56	17	36	1	0.05	<0.0001	<0.001	<0.001	<0.001	0.004	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.2	<0.0001	1.62	2.1	0.06	5.64	5.78
	15/06/2023	7.7	521	302	<5	0.9	186	50	17	36	<1	0.02	<0.0001	<0.001	<0.001	<0.001	0.004	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.2	<0.0001	1.68	2.1	0.06	5.54	5.46
	14/07/2023	7.51	524	302	<5	0.6	184	50	22	39	1	0.02	<0.0001	<0.001	<0.001	<0.001	0.039	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1	<0.0001	1.68	2.1	0.16	5.73	6.03
	14/08/2023	7.51	532	350	<5	0.4	190	53	18	38	1	0.03	<0.0001	<0.001	<0.001	<0.001	0.003	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	1.3	<0.0001	1.62	2	0.09	5.83	5.8
	14/09/2023	7.5	522	323	<5	0.5	181	50	17	35	<1	0.08	<0.0001	<0.001	<0.001	<0.001	0.005	<0.001	<0.01	<0.001	<0.005	<0.05	0.09	<0.5	1.1	<0.0001	1.44	1.7	0.07	5.23	5.42
	12/10/2023	7.51	526	295	<5	0.6	190	56	19	37	1	0.04	<0.0001	<0.001	<0.001	<0.001	0.003	<0.001	<0.01	<0.001	<0.005	<0.05	<0.05	<0.5	0.9	<0.0001	1.13	1.5	0.05	5.56	5.99
	6/11/2023																														
	13/12/2023																														
SW4	1703/2023																														
	15/06/2023																														
	14/09/2023																														
	13/12/2023																														
SW5	1703/2023	7.88	418	337	92	98	137	31	18	36	4	1.77	<0.0001	0.002	0.009	<0.001	0.161	0.004	<0.01	<0.001	0.008	<0.05	1.89	<0.5	1.4	<0.0001	2.8	4	0.52	4.45	4.7
	15/06/2023	8.14	834	450	23	24.6	244	59	38	66	3	0.92	<0.0001	<0.001	0.001	<0.001	0.108	<0.001	<0.01	<0.001	<0.005	<0.05	1.08	<0.5	1	<0.0001	0.9	1.9	0.12	8.95	9.02
	14/09/2023	8.22	544	314	111	37.5	173	42	24	39	3	9.14	<0.0001	0.012	0.014	0.004	0.512	0.013	<0.01	<0.001	0.023	<0.05	12	<0.5	0.7	<0.0001	0.43	1.8	0.48	5.49	5.84
	13/12/2023	8.12	561	322	67	40	188	42	26	46	3	0.59	<0.0001	<0.001	0.003	<0.001	0.196	0.002	<0.01	<0.001	0.008	<0.05	0.73			<0.0001	0.01	0.9	0.17	5.9	6.31
SW6	17/01/2023	8.47	596	352	51	23.8																									
	15/02/2023	7.99	483	292	54	40.7																									
	17/03/2023	7.92	420	318	102	106																									
	14/04/2023	8.09	587	339	60	56.6																									
	16/05/2023	8.33	933	504	32	13.2	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	15/06/2023	8.15	842	449	25	22.6																									
	14/07/2023	8.4	444	513	14	13.5																									
	14/08/2023	8.41	1000	595	26	12.2																									
	14/09/2023	8.24	578	336	89	26.3																									

	12/10/2023	8.03	459	274	55	35.7																										
	6/11/2023	8.4	407	254	68	37.2																										
	13/12/2023	8.16	531	325	82	44.5																										
SW7	17/01/2023	8.45	602	358	28	21.1	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
	15/02/2023	7.98	462	268	40	55.9																										
	17/03/2023	7.92	422	328	120	115																										
	14/04/2023	8.12	612	354	62	53.9																										
	16/05/2023	8.32	925	504	33	22.5																										
	15/06/2023	8.19	836	440	30	26																										
	14/07/2023	8.34	917	535	18	12																										
	14/08/2023	8.45	973	530	36	14.6																										
	14/09/2023	8.24	592	330	97	34.3																										
	12/10/2023	8.06	475	277	62	38.4																										
	6/11/2023	8.42	408	246	70	44.2																										
	13/12/2023	8.16	722	434	74	52.9																										
SW8	1703/2023	7.95	436	328	141	121	136	30	19	40	4	5.99	<0.0001	0.007	0.006	0.001	0.221	0.009	<0.01	<0.001	0.01	<0.05	6.76	<0.5	1.7	<0.0001	3.2	4.6	0.58	4.53	4.9
	15/06/2023	8.21	777	430	37	33.1	235	56	35	62	3	1.75	<0.0001	0.001	0.001	<0.001	0.088	<0.001	<0.01	<0.001	<0.005	<0.05	2.04	<0.5	1	<0.0001	0.83	1.4	0.10	8.5	8.45
	14/09/2023	8.29	590	346	111	44.1	186	44	26	42	3	4.01	<0.0001	0.005	0.007	0.001	0.251	0.005	<0.01	<0.001	0.011	<0.05	4.97	<0.5	0.6	<0.0001	0.49	1.4	0.18	6.06	6.24
	13/12/2023	8.2	739	444	81	51.1	201	49	32	58	3	2.18	<0.0001	0.003	0.004	<0.001	0.16	0.004	<0.01	<0.001	0.006	<0.05	2.55			<0.0001	0.01	0.8	0.15	7.26	7.68
SW9	1703/2023	Dry																														
	15/06/2023																															
	14/09/2023																															
	13/12/2023																															

Sampling was unable to be taken at all monitoring locations as Back Creek and Upper Maules Creek are ephemeral. NR = not recorded

Table D-2
Sediment Dam Triggers

Parameter	100th percentile
Oil and grease (mg/L)	10
pH	6.5-8.5
Total suspended solids (mg/L)	50

Table D-3
Off-site Discharge Monitoring Laboratory Results

Location	Date	pH	Electrical Conductivity @ 25°C	Total Dissolved Solids @180°C	Suspended Solids	Turbidity	Total Alkalinity as CaCO3	Calcium	Magnesium	Sodium	Potassium	Aluminium (total)	Cadmium (total)	Chromium (total)	Copper (total)	Lead (total)	Manganese (total)	Nickel (total)	Selenium (total)	Silver (total)	Zinc (total)	Boron (total)	Iron (total)	Arsenious Acid, As (III)	Arsenic Acid, As (V)	Mercury	Nitrite + Nitrate as N	Total Nitrogen as N	Total Phosphorus as P	Oil and Grease
		pH Unit	µS/cm	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L	mg/L	mg/L
HWD11	19/04/2023	8.39	220	98.1	29.5	250	63	5.6	5	23	7.2	12	<0.001	0.007	0.006	0.006	0.068	0.011	<0.001	<0.002	0.031	<0.020	10	<1	1	<0.005	<0.005	0.9	0.1	<10
SD7	21/03/2023	8.2	900	394	6	12	320	53	17	110	8.8	0.46	<0.001	<0.001	<0.001	<0.001	0.5	<0.001	<0.001	<0.001	0.002	0.06	0.57	<1	<1	<0.005	<0.005	2.2	0.1	<5
	18/04/2023	8	560	249	35	50	120	36	7.2	67	5	2.2	<0.001	0.001	0.002	<0.001	0.12	0.002	<0.001	<0.001	0.006	0.04	0.71	<1	<1	<0.005	0.053	4.1	0.06	<5

Table D-4

On-site Surface Water Monitoring

Site	Parameter	Units	Frequency	Samples	Date	Min	Mean	Max/Only Value
Mine Void	TSS	mg/L	Every 2 Months	1	24/02/2023	-	-	<5
	Conductivity	µs/cm				-	-	1310
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.16
Mine Void	TSS	mg/L	Every 2 Months	1	20/03/2023	-	-	<5
	Conductivity	µs/cm				-	-	1290
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.17
Mine Void	TSS	mg/L	Every 2 Months	1	15/05/2023	-	-	23
	Conductivity	µs/cm				-	-	1240
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.42
Mine Void	TSS	mg/L	Every 2 Months	1	13/07/2023	-	-	<5
	Conductivity	µs/cm				-	-	1320
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.20
Mine Void	TSS	mg/L	Every 2 Months	1	14/09/2023	-	-	8
	Conductivity	µs/cm				-	-	1310
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.17
Mine Void	TSS	mg/L	Every 2 Months	1	12/12/2023	-	-	<5
	Conductivity	µs/cm				-	-	1320
	Oil & Grease	mg/L				-	-	<5
	pH	pH				-	-	8.17

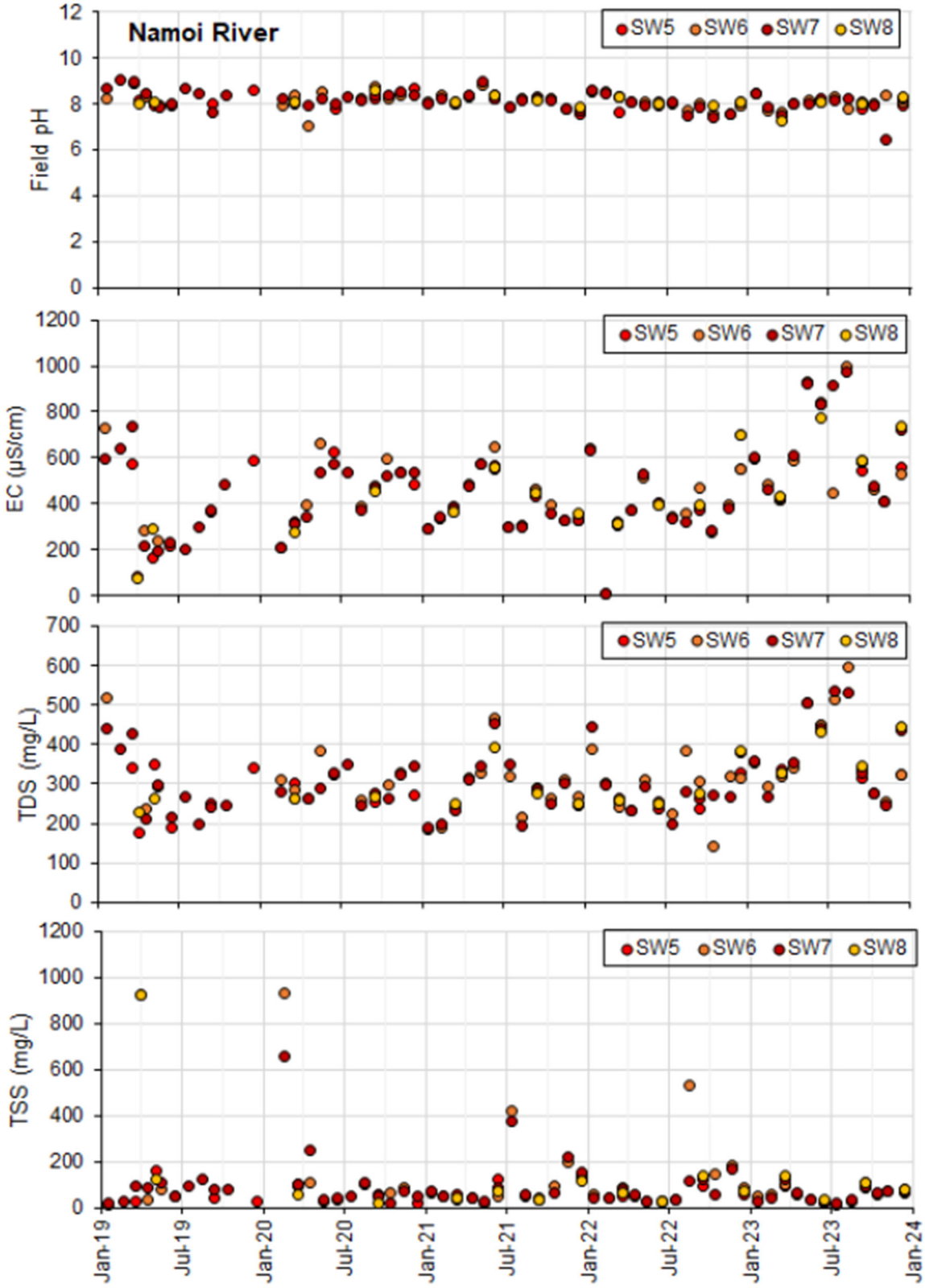


Figure D-1 – Namoi River surface water quality trends (5 year summary – 2019 to 2023)

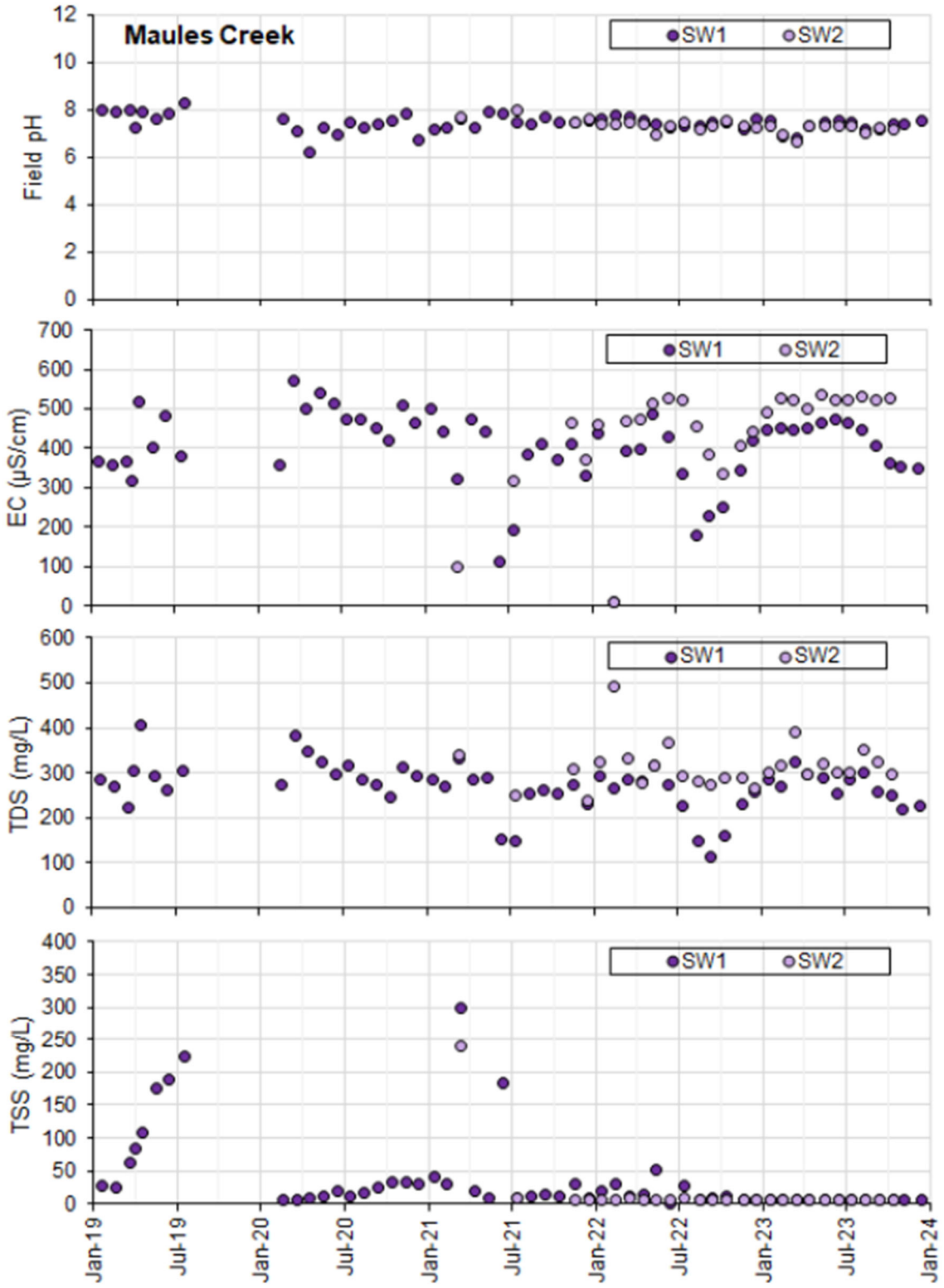


Figure D-2 – Maules Creek surface water quality trends (5 year summary – 2019 to 2023)

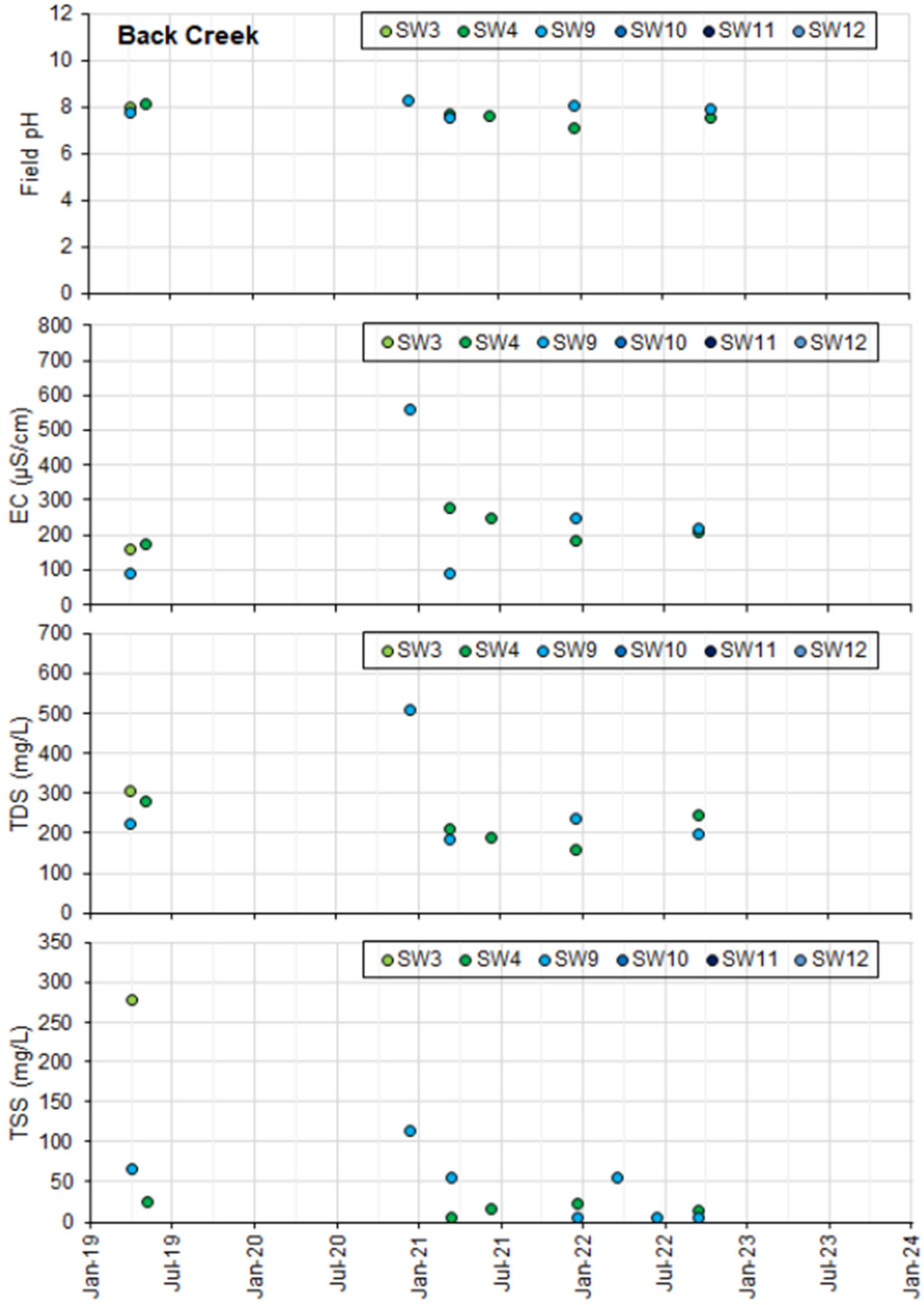


Figure D-3 – Back Creek surface water quality trends (5 year summary – 2019 to 2023)

APPENDIX E

Groundwater

Appendix E

Table E-1

Groundwater monitoring network bore details

Bore ID	Managed by [a]	Geology [b]	Status [c]	Type [d]	Easting (m)	Northing (m)	Ground elevation [e] (m AHD)	Depth (mbgl)	Screen or VWP sensor depth (m bgl)	Purpose [f]	Water quality analysis [g]
BCM01	BTM	Alluvium	A	SP (dry)	223,841	6,618,371	273.4	10	6.75 - 9.75	4	Q
BCM03	BTM	Alluvium	A	SP (dry)	230,085	6,617,546	305	10	6.75 - 9.75	4	Q
BCM04	MCCM	Volcanics	A	SP (LL)	224,115	6,618,252	276.86	20	14.0 – 20.0	3, 4, 5,	Q
BCM05	MCCM	Alluvium or weathered overburden (first	A	SP (LL)	226,653	6,618,293	287.13	20	14.0 – 20.0	3, 4, 5, 7, 10 11	Q
Brighton Bore	MCCM	Alluvium	A	SP	219,194	6,603,840	TBC	TBC	TBC	3, 5, 7,	Q
Brighton Bore	MCCM	Alluvium	A	SP (LL)	219,942	6,604,179	TBC	16.4	12.8 – 15.8	3, 5, 7,	Q
GW030129_1	WaterNSW	Alluvium	A	SP	217,135	6,619,637	248	24.4	23.2 - 24.4	1, 7	Q
GW030472_1	WaterNSW	Alluvium	A	SP	225,148	6,602,611	248	101.5	23.8 - 25	1, 7	Q
GW030472_2	WaterNSW	Alluvium	A	SP	225,148	6,602,611	248	101.5	57.3 - 59.7	1, 7	Q
GW030472_3	WaterNSW	Alluvium	A	SP	225,148	6,602,611	248	101.5	94.5 - 101.5	1, 7	Q
GW041027_1	WaterNSW	Alluvium	A	SP	232,730	6,620,523	318.5	18	8.25 - 14.25	1, 7	Q
GW967138_1	WaterNSW	Alluvium	A	SP	227,001	6,622,422	313.6	82.5	7-10	1, 7	Q
GW967138_2	WaterNSW	Alluvium	A	SP	227,001	6,622,422	313.6	82.5	71 - 77	1, 7	Q
MAC1218	MCCM	Permian	D	SP	224,016	6,613,693	361.4	110	107-110	6	-
MAC1219	MCCM	Permian	D	SP	224,172	6,613,678	370.4	163	107-220	6	-
MAC1259	MCCM	Permian	D	SP	224,959	6,616,286	317	98	94-97	6	-
MAC1261	MCCM	Permian	D	SP	226,750	6,614,872	382.3	180	161-164	6	-
MAC1279	MCCM	Permian	D	SP	226,446	6,616,312	326.9	144	70-73	6	-
MAC1280	MCCM	Permian	A	SP (LL)	226,525	6,616,503	323.5	60	56-59	5, 6, 8,	Q
MAC1283	MCCM	Permian	D	SP	224,989	6,616,291	318.2	91	61-64	6	-
MAC252	MCCM	Permian	D	SP	266,231	6,614,775	340.6	260	92.5-98.5	6	-
MAC263	MCCM	Permian	D	VWP	226,037	6,614,513	348.3	234	105 / 183	6	-
MAC267P	MCCM	Permian	D	VWP	227,440	6,616,472	405.6	299	164 / 257	6	-
MAC268P	MCCM	Permian	D	VWP	227,498	6,614,521	416.8	318	107-220	6	-
RB01	MCCM	Permian	D	VWP	224,058	6,612,333	433.1	205	97 / 140.5 / 194.5	2, 6	-

Bore ID	Managed by [a]	Geology [b]	Status [c]	Type [d]	Easting (m)	Northing (m)	Ground elevation [e] (m AHD)	Depth (mbgl)	Screen or VWP sensor depth (m bgl)	Purpose [f]	Water quality analysis [g]
RB01A	MCCM	Permian	D	SP	224,058	6,612,341	432.4	205	213.5 - 219.5	2, 5, 6	-
RB02	MCCM	Permian	D	VWP	224,860	6,613,267	381.7	220.5	110 / 162 / 225	2, 6	-
RB02A	MCCM	Permian	D	SP	224,853	6,613,266	398.1	270	227 - 233	2, 5, 6	-
RB03	MCCM	Permian	A	VWP	227,947	6,613,635	407.9	324.4	164 / 242 / 289 / 317	2, 6, 10	-
RB04	MCCM	Permian	A	VWP	228,213	6,614,910	437.5	354	209 / 272.5 / 309 / 339	2, 6, 10	-
RB05	MCCM	Permian	A	VWP	228,071	6,616,813	328	382	107 / 231 / 280 / 382	2, 6, 10	-
RB05A	MCCM	Permian	A	SP (LL)	228,065	6,616,810	328.4	245.3	239 - 245	2, 5, 6,	Q
RB05B	MCCM	Braymont seam	A	SP (LL)	228,066	6,616,825	327.49	110	104.0 – 110.0	2, 5, 8,	Q
REG1	BTM	Permian	A	VWP	226,946	6,622,396	286.2	255.2	118.7 / 134.5 / 193.5 / 281.5	1, 2, 4, 10	-
REG10	BTM	Permian	A	VWP	226,723	6,618,261	287.1	189.4	55 / 144.2 / 178 / 185.5	1, 2, 4, 6, 10	-
REG10A	BTM	Alluvium	A	SP (dry)	226,717	6,618,260	287.1	10	6.75 - 9.75	1, 2, 4,	Q
REG10B	BTM	Braymont seam	A	SP (LL)	226,650	6,618,298	287.08	43	37.0 – 43.0	2, 5, 8,	Q
REG12	BTM	Volcanics	A	SP (LL)	222,632	6,617,358	285.6	48.3	38.4 - 44.4	1, 4, 5,	Q
REG13	BTM	Volcanics	A	SP (LL)	219,713	6,611,129	277.1	133	128 - 132	1, 5, 10	Q
REG14	BTM	Alluvium	A	SP (LL)	225,547	6,602,649	250.2	102	90 - 96	1, 5, 10	Q
REG15	BTM	Alluvium	A	SP (LL)	229,243	6,622,360	297.75	29.9	23.9 – 29.9	5, 7, 10,	Q
REG15A	BTM	Permian coal	A	SP (LL)	229,250	6,622,354	297.76	100.5	93.4 – 99.4	5, 10	Q
REG16	BTM	Alluvium	A	SP (LL)	227,084	6,622,320	287.13	30	24.0 – 30.0	5, 7, 10,	Q
REG16A	BTM	Permian coal	A	SP (LL)	227,074	6,622,316	287.13	59.9	53.9 – 59.9	5, 10	Q
REG2	BTM	Permian	A	VWP	232,722	6,620,459	317	255.2	60 / 120 / 200 / 260	1, 2, 4,	-
REG3	BTM	Volcanics	A	SP (LL)	217,164	6,619,558	241.6	57	50.50 - 56.50	1, 2, 5,	-
REG4	BTM	Volcanics	A	SP (LL)	219,323	6,612,763	260	72.5	65.5 - 71.5	1, 5, 10	Q
REG4A	MCCM	Alluvium	A	SP (LL)	219318	6612774.6	259.99	40	33.9 – 39.9	5, 7, 10	Q
REG5	BTM	Volcanics	A	SP (LL)	220,649	6,609,521	252.2	78.7	72.2 - 78.2	1, 2, 5,	Q
REG5A	BTM	Alluvium	A	SP (dry)	220,646	6,609,514	252	22	18 - 21	1, 2, 5,	Q
REG6	BTM	Volcanics	A	SP (LL)	223,100	6,606,534	250.7	96	88.0 - 94.0	1, 5, 10	Q
REG7	BTM	Permian	A	VWP	233,543	6,605,348	291.6	255.2	67.5 / 148.2 / 242.5	1, 2, 4,	-
REG7A	BTM	Alluvium	A	SP (LL)	233,545	6,605,359	291.7	36	24 - 30	1, 2, 4,	Q

Bore ID	Managed by [a]	Geology [b]	Status [c]	Type [d]	Easting (m)	Northing (m)	Ground elevation [e] (m AHD)	Depth (mbgl)	Screen or VWP sensor depth (m bgl)	Purpose [f]	Water quality analysis [g]
REG8	BTM	Permian	A	VWP	230,030	6,616,113	341.6	TBC	91.5 / 221 / 274	1, 6, 10	-
REG9	BTM	Permian	A	VWP	234,233	6,610,591	346.8	279.2	116.8 / 175.2 / 268	1, 6, 10	-
Roma MB	MCCM	Alluvium	A	SP (LL)	218,612	6,605,871	TBC	89	TBC	3, 5, 7,	Q
Roma	MCCM	Alluvium	A	SP (LL)	219,058	6,606,417	TBC	~12	TBC	3, 5, 7,	Q
WRD01	MCCM	Weathered	A	SP (LL)	226,091	6,618,354	286.76	20	14.0 – 20.0	5, 9, 10	Q
WRD02	MCCM	Volcanics	A	SP (LL)	223,510	6,616,824	297.23	49.9	43.9 – 49.9	5, 7, 9,	Q

SP = standpipe bore, VWP = vibrating wire piezometer, logger = datalogger installed, dry = bore currently dry so no datalogger installed.
Status: D = decommissioned, A = active and P = proposed
Details for private bores have been estimated based on the registered bore closest to the monitored location. Not all construction details are available for each site, and several bores are some distance from the closest registered bore so all construction details remain uncertain. * = elevation of private bore interpolated from groundwater model DEM, TBC = To be confirmed.

Table E-1

Private Groundwater Bores Details

Bore ID	Managed by [a]	Geology [b]	Easting (m)	Northing (m)	Ground elevation [c] (m AHD)	Depth (m bgl)	Screen depth (m bgl)	Water quality analysis [d]
BAS1	Third party on WHC land	TBC	217,107	6,612,427	239*	TBC	TBC	Bi
BAS2 (Olivedene)	MCCM	TBC	217,548	6,612,037	238*	TBC	TBC	Bi
BRE2	Third party	Hard rock	234,377	6,616,639	354*	96.3	TBC	Bi
Brighton Extraction	MCCM	Alluvium	219,808	6,603,952	TBC	TBC	TBC	Bi
GW002831	Third party on WHC land	TBC	221,313	6,620,116	TBC	TBC	TBC	Bi
GW006567	Third party on WHC land	TBC	221,374	6,618,792	TBC	59.1	28.7 - 29.3 / 57.9 - 58.5	Bi
MOR1	Third party on WHC land	TBC	220,649	6,619,125	260*	TBC	TBC	Bi
MOR2	Third party on WHC land	TBC	219,871	6,618,803	256*	TBC	TBC	Bi
MORSE	Third party on WHC land	Sandstone	228,203	6,617,691	302*	63.1	TBC	Bi
Roma Irrigation	MCCM	Alluvium	218,867	6,606,221	TBC	TBC	TBC	Bi
School	Third party	Gravel	224,673	6,623,048	282*	8.4	TBC	Bi
TESTON	Third party on WHC land	Hard rock	222,568	6,619,102	270*	45.4	TBC	Bi
TRALEE	Third party on WHC land	Basalt	224,102	6,618,538	278*	33.8	TBC	Bi
WHAN	Third party	TBC	221,134	6,622,897	264*	10	TBC	Bi
WOL1	Third party on WHC land	TBC	226,799	6,622,149	290*	7.2	TBC	Bi

Bore ID	Managed by [a]	Geology [b]	Easting (m)	Northing (m)	Ground elevation [c] (m AHD)	Depth (m bgl)	Screen depth (m bgl)	Water quality analysis [d]
WOL2	Third party on WHC land	TBC	226,119	6,618,673	285*	TBC	TBC	Bi

Table E-3

Regional Groundwater Bores

Date	RB05A	Reg3	Reg4	Reg5	Reg5A	Reg6	Reg7A	Reg10Aa	Reg12	Reg13	Reg14	BCM01	BCM03	Roma Windmill	Roma MB	Brighton Bore 3
Jan-23	80.73	11.67	21.28	17.92	*dry*	19.43	4.32	*dry*	23.64	19.71	18.22	*dry*	*dry*	6.66	7.58	7.86
Feb-23	81.10	11.92	23.25	17.88	*dry*	19.54	4.56	*dry*	34.45	19.58	18.10	*dry*	*dry*	6.68	7.71	7.46
Mar-23	81.43	12.30	21.19	17.85	*dry*	19.25	4.81	*dry*	20.40	19.46	18.21	*dry*	*dry*	6.72	7.84	7.86
Apr-23	81.78	11.99	21.20	15.75	*dry*	19.06	5.04	*dry*	23.33	19.50	15.76	*dry*	*dry*	6.83	7.98	7.81
May-23	81.66	11.68	21.14	17.77	*dry*	19.04	5.24	*dry*	23.25	19.40	17.67	*dry*	*dry*	6.89	8.06	7.83
Jun-23	82.86	11.47	21.10	17.78	*dry*	17.78	5.39	*dry*	23.15	19.46	17.72	*dry*	*dry*	7.00	8.25	7.86
Jul-23	83.22	11.44	20.97	17.75	*dry*	18.85	5.58	*dry*	23.14	19.36	17.52	*dry*	*dry*	7.10	8.31	7.82
Aug-23	83.96	11.47	20.93	17.54	*dry*	18.80	5.66	*dry*	23.12	18.32	17.72	*dry*	*dry*	7.15	8.37	7.33
Sep-23	*NA*	11.49	20.88	17.71	*dry*	18.31	5.68	*dry*	23.05	19.33	17.75	*dry*	*dry*	7.17	8.40	7.90
Oct-23	85.30	12.03	20.76	17.65	*dry*	18.84	5.90	*dry*	23.06	19.31	18.69	*dry*	*dry*	7.35	8.61	8.01
Nov-23	85.75	12.31	20.72	17.39	*dry*	18.85	5.95	*dry*	23.04	19.27	18.62	*dry*	*dry*	7.39	8.81	7.99
Dec-23	86.09	12.35	20.29	17.36	*dry*	18.83	5.99	*dry*	22.93	19.26	18.20	*dry*	*dry*	7.38	8.63	8.04

Shaded cells indicate dry bore NA = no information available

Table E-4

Registered Monitoring Bores Groundwater Levels (mbgl)

Month	BCM05	RB05B	Reg4A	Reg10B	Reg15	Reg16	WRD01	WRD02	BCM04
Jun	9.31	48.33	NA	3.60	3.30	52.05	19.85	29.87	15.34
Jul	9.27	48.29	20.98	3.62	3.43	52.04	19.82	29.65	15.32
Aug	9.21	48.30	20.93	3.67	3.71	52.05	19.83	29.47	15.33
Sep	9.20	48.34	20.87	3.75	4.02	52.06	19.84	29.32	15.38
Oct	9.19	48.40	20.82	3.84	4.36	52.08	19.87	29.22	15.44
Nov	9.21	48.46	20.78	3.93	4.63	52.09	19.91	29.18	15.52
Dec	9.23	48.53	20.74	4.01	4.74	52.11	19.94	29.13	15.59

Note: values presented are monthly averages calculated from 6-hour interval daily telemetry data NA = no information available

Table E-5

Groundwater Monitoring Results and Comparison with ANZECC Guideline Trigger Values

Location	Date	Lab pH value	Lab electrical conductivity @ 25°C	TDS @ 180°C	Sulfate as SO4	Aluminium (filt.)	Arsenic (filt.)	Barium (filt.)	Cadmium (filt.)	Copper (filt.)	Lead (filt.)	Lithium (filt.)	Manganese (filt.)	Molybdenum (filt.)	Nickel (filt.)	Zinc (filt.)	Boron (filt.)	Iron (filt.)	Ammonia as N	Nitrite as N	Nitrate as N	Total anions	Total cations	Ionic balance
		pH Unit	µS/cm	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	meq/L	meq/L	%
ANZECC Guideline value	Drinking water	6.5-8.5	-	600	500/250	0.2**	0.01	0.2*	0.002*	2-Jan	0.01*	-	0.5*/0.1**	0.05*	0.02*	3	4*	0.3**	0.5	3	50	-	-	-
	Livestock drinking water	-	-	3000-13000	1000-2000	5	0.5	-	0.01	0.5-5	0.1	-	-	0.15	1	20	5	-	-	30	-	-	-	-
	Long-term irrigation water	6.0-8.5	-	-	-	5	0.1	-	0.01	0.2	2	2.5	0.2	0.01	0.2	2	0.5	0.2	-	-	-	-	-	-
Limit of reporting		0.1	1	1	1	0.01	0.001	0.001	0.0001	0.001	0	0.001	0.001	0.001	0.001	0.01	0.05	0.05	0.01	0.01	0.01	0.01	0.01	0.01
RB05a	10/03/2023	7.61	1850	1070	82	<0.01	<0.001	0.291	<0.0001	<0.001	<0.001	0.029	0.101	0.006	0.009	0.066	0.05	0.12	0.8	0.02	0.06	21.2	20.1	2.68
	14/06/2023	7.48	1840	968	68	<0.01	<0.001	0.268	<0.0001	0.005	<0.001	0.022	0.075	0.006	0.007	0.012	0.05	<0.05	0.8	0.02	0.25	20	20.2	0.48
	31/08/2023	7.69	1820	1150	76	<0.01	<0.001	0.272	<0.0001	0.002	<0.001		0.083	0.006	0.008	0.035	0.06	0.08	0.77	0.23	<0.01	20.1	20.2	0.29
	29/11/2023	7.56	1910	1140	68	<0.01	<0.001	0.296	<0.0001	<0.001	<0.001	0.027	0.1	0.012	0.013	0.011	0.06	0.24	0.77	<0.01	0.15	20.5	19.6	2.19
Reg3	10/03/2023	7.74	1270	750	110	<0.01	0.001	0.019	<0.0001	<0.001	0.002	0.002	0.148	0.012	0.001	0.009	0.08	<0.05	0.02	<0.01	0.02	14.3	13.7	1.86
	14/06/2023	7.72	1220	736	90	<0.01	0.003	0.026	<0.0001	<0.001	<0.001	0.002	0.251	0.011	0.001	0.011	0.06	<0.05	0.06	<0.01	0.06	12.9	13	0.27
	31/08/2023	7.85	1220	757	97	<0.01	0.002	0.016	<0.0001	<0.001	<0.001		0.204	0.009	<0.001	0.012	0.07	<0.05	0.02	<0.01	0.04	12.9	13.2	1.22
	29/11/2023	7.79	1240	795	92	<0.01	0.003	0.019	<0.0001	0.001	<0.001	<0.001	0.221	0.012	0.001	0.018	0.1	<0.05	0.05	<0.01	0.02	13.2	12.7	1.76
Reg4	8/03/2023	8.04	1130	672	22	<0.01	<0.001	0.011	<0.0001	<0.001	<0.001	0.051	0.037	0.004	<0.001	0.019	0.08	<0.05	0.03	0	0.28	12.4	12	1.74
	7/06/2023	8.21	1300	738	36	<0.01	0.001	0.021	<0.0001	0.001	<0.001	0.054	0.017	0.004	<0.001	0.013	0.11	<0.05	<0.01	0	0.33	14	13.3	2.37
	28/08/2023	8.05	1090	696	13	<0.01	<0.001	0.014	<0.0001	0.002	<0.001		0.017	0.003	<0.001	0.016	0.07	<0.05	<0.01	<0.01	0.47	11.8	12	0.5
	28/11/2023	7.95	1210	688	26	<0.01	0.002	0.014	<0.0001	<0.001	<0.001	0.039	0.02	0.003	0.001	0.013	0.1	<0.05	0.03	0	0.23	13.4	12.4	3.88
Reg5	8/03/2023	7.85	1810	1120	274	<0.01	<0.001	0.01	<0.0001	<0.001	<0.001	0.004	0.464	0.004	0.002	0.041	0.05	<0.05	0.32	0.01	0.01	20.3	18.4	4.72
	7/06/2023	7.85	1870	1150	268	<0.01	<0.001	0.016	<0.0001	<0.001	<0.001	0.005	0.362	0.004	<0.001	0.027	0.06	<0.05	0.32	<0.01	<0.01	20.2	18	5.74
	29/08/2023	7.91	1800	1170	228	<0.01	<0.001	0.014	<0.0001	<0.001	<0.001		0.389	0.003	<0.001	0.021	<0.05	<0.05	0.29	<0.01	0.06	18.7	19.2	1.32

	28/11/2023	7.93	1820	1080	233	<0.01	<0.001	0.015	<0.0001	<0.001	<0.001	0.005	0.406	0.004	0.002	0.039	0.06	<0.05	0.29	<0.01	<0.01	19.6	18.4	3.06
Reg6	9/03/2023	7.83	1830	1050	130	<0.01	0.002	0.046	<0.0001	<0.001	<0.001	0.005	0.132		0.004	<0.005	0.07	<0.05	0.38	<0.01	0.02	19.9	18	5.1
	8/06/2023	7.86	1820	1090	136	<0.01	0.002	0.042	<0.0001	<0.001	<0.001	0.005	0.134		0.002	0.02	0.08	<0.05	0.43	<0.01	<0.01	18.9	17.3	4.3
	29/08/2023	7.87	1850	1050	109	<0.01	0.001	0.043	<0.0001	<0.001	<0.001		0.112		0.002	0.066	0.08	<0.05	0.6	<0.01	0.16	18.6	18.3	0.85
	28/11/2023	7.82	2000	1140	172	<0.01	0.002	0.041	<0.0001	<0.001	<0.001	0.006	0.155		0.003	0.564	0.1	<0.05	0.48	<0.01	0.04	20.4	18.9	3.89
Reg7a	9/03/2023	7.16	916	557	70	<0.01	0.001	0.11	<0.0001	0.008	0.008	0.004	0.214	<0.001	0.002	0.058	<0.05	<0.05	<0.01	0.04	0.72	10.2	9.79	1.79
	8/06/2023	7.16	914	580	67	<0.01	0.001	0.101	<0.0001	0.003	<0.001	0.003	0.212	<0.001	0.001	0.031	<0.05	<0.05	<0.01	0.05	0.53	9.86	9.4	2.43
	29/08/2023	7.38	855	544	52	<0.01	0.001	0.098	<0.0001	0.005	<0.001		0.122	<0.001	0.001	0.049	<0.05	<0.05	<0.01	<0.01	0.44	9.5	9.65	0.77
	28/11/2023	7.35	867	552	49	<0.01	0.002	0.106	<0.0001	0.002	<0.001	0.002	0.099	<0.001	0.001	0.034	<0.05	<0.05	0.01	0.02	0.37	9.37	9.11	1.43
Reg12	10/03/2023	7.39	2270	1470	75	<0.01	<0.001	0.082	<0.0001	0.001	0.009	0.037	0.112	0.003	0.002	0.042	0.12	0.06	0.02	<0.01	<0.01	27.4	25.3	4.01
	14/06/2023	7.4	2260	1410	63	<0.01	0.001	0.068	<0.0001	<0.001	<0.001	0.033	0.123	0.003	0.001	0.023	0.11	<0.05	0.05	<0.01	0.13	25.8	24.7	2
	31/08/2023	7.52	2250	1430	68	<0.01	0.001	0.076	<0.0001	<0.001	<0.001		0.104	0.002	<0.001	0.023	0.1	0.12	0.12	<0.01	0.07	25.3	25.7	0.72
	29/11/2023	7.46	2360	1550	69	<0.01	0.002	0.089	<0.0001	<0.001	<0.001	0.042	0.085	0.003	0.001	0.024	0.13	0.09	0.06	<0.01	<0.01	27.6	25.8	3.32
Reg13	8/03/2023	7.58	3380	2540	1370	<0.01	<0.001	0.044	0.0001	<0.001	<0.001	0.018	0.426	0.012	0.013	0.264	0.16	<0.05	0.1	<0.01	<0.01	43.4	38.8	5.55
	7/06/2023	7.58	3170	2540	1360	<0.01	0.001	0.044	<0.0001	0.002	0.001	0.011	0.418	0.01	0.004	0.117	0.17	<0.05	0.08	<0.01	<0.01	41.7	37.7	5
	28/08/2023	7.7	3470	2670	1190	<0.01	0.001	0.042	0.0002	0.006	<0.001		0.416	0.008	0.005	0.086	0.17	<0.05	0.09	<0.01	0.15	38.6	40.2	1.97
	28/11/2023	7.51	3660	2890	1160	<0.01	0.001	0.042	0.0005	<0.001	<0.001	0.011	0.476	0.009	0.007	1.71	0.19	<0.05	0.05	<0.01	0.05	40.5	40.2	0.39
Reg14	9/03/2023	7.53	913	529	44	<0.01	0.003	0.033	<0.0001	<0.001	<0.001	<0.001	0.144	0.005	0.003	0.015	<0.05	0.17	0.08	<0.01	<0.01	9.78	10	1.29
	8/06/2023	7.47	946	564	52	<0.01	0.002	0.029	<0.0001	0.002	<0.001	<0.001	0.126	0.006	0.002	0.011	<0.05	0.16	0.05	<0.01	<0.01	9.84	9.16	3.54
	29/08/2023	7.57	1070	686	59	<0.01	0.002	0.027	0.0002	<0.001	<0.001		0.14	0.005	0.003	0.41	<0.05	0.05	0.13	<0.01	0.23	11.4	11.6	0.91
	28/11/2023	7.57	1000	655	52	<0.01	0.003	0.028	<0.0001	<0.001	<0.001	<0.001	0.134	0.005	0.002	0.543	0.05	<0.05	<0.01	<0.01	0.03	11	10.2	3.8
Mac 1280	10/03/2023	11.6	2070	1250	212	1.66	<0.001	0.046	<0.0001	0.01	<0.001	0.098	<0.001	0.024	0.004	0.107	<0.05	<0.05	1.06	0.52	2.06	22.5	19.3	7.83
	14/06/2023	11.8	2240	1200	105	1.41	0.001	0.039	<0.0001	0.009	<0.001	0.07	0.002	0.026	0.003	<0.005	<0.05	<0.05	1.73	0.56	2.16	19.4	18.9	1.48
	31/08/2023	11.2	2130	1360	79	1.14	<0.001	0.037	<0.0001	0.004	<0.001		<0.001	0.021	0.002	<0.005	<0.05	<0.05	1.51	0.64	3.04	18.2	18.8	1.68
	29/11/2023	11.8	2400	1480	46	1.63	0.001	0.064	<0.0001	0.004	<0.001	0.09	<0.001	0.029	0.007	<0.005	<0.05	<0.05	2.67	0.93	1.89	20.6	20.2	1.13
MOR1	22/02/2023	7.32	1140	754	41	<0.01	<0.001	0.116	<0.0001	0.006	<0.001	0.012	0.006	<0.001	<0.001	0.016	0.1	<0.05	<0.01	<0.01	12.1	11.4	12.6	4.88

	21/08/2023	7.61	1590	944	40	<0.01	<0.001	0.053	<0.0001	0.013	<0.001	0.024	0.017	0.002	0.003	0.639	0.11	<0.05	0.02	0.78	4.64	16.6	17.6	3.12
Mor 2	22/02/2023	7.67	170	94	<1	<0.01	<0.001	0.005	<0.0001	<0.001	<0.001	0.007	0.107	<0.001	<0.001	<0.005	<0.05	<0.05	<0.01	<0.01	0.18	1.74	1.88	----
	21/08/2023	7.92	293	162	<1	<0.01	<0.001	0.003	<0.0001	<0.001	<0.001	0.008	0.056	<0.001	<0.001	<0.005	<0.05	<0.05	<0.01	<0.01	0.02	2.88	2.96	----
Teston	22/02/2023	7.54	927	480	7	<0.01	<0.001	0.045	0.0005	0.004	<0.001	0.01	0.237	0.001	0.001	0.009	0.07	2.55	0.2	0.01	0.03	10.4	11	2.73
	21/08/2023	7.57	1200	734	12	<0.01	<0.001	0.054	<0.0001	<0.001	<0.001	0.012	0.293	0.001	<0.001	<0.005	0.08	2.71	0.22	<0.01	<0.01	13.7	14.2	1.51
Tralee	22/02/2023	7.13	1790	1080	65	<0.01	<0.001	0.157	<0.0001	<0.001	<0.001	0.007	3.68	<0.001	0.004	0.015	<0.05	2.36	1.54	0.07	<0.01	20.3	19.9	1.02
	21/08/2023	7.18	1390	749	31	<0.01	<0.001	0.134	<0.0001	<0.001	<0.001	0.006	3.93	<0.001	0.002	0.008	<0.05	3.13	0.82	<0.01	0.05	15.6	15.6	0.04
Morse	22/02/2023	7.37	443	428	<10	0.03	<0.001	0.015	0.0002	0.006	<0.001	0.012	1.1	<0.001	0.008	0.136	0.05	3.66	1.18	0.06	0.01	4.75	5.13	3.83
	21/08/2023	7.74	901	621	12	0.01	<0.001	0.015	<0.0001	0.002	<0.001	0.019	0.725	<0.001	0.004	0.098	0.06	4.57	0.4	<0.01	0.04	10.2	10.4	0.88
Bre2	22/02/2023	7.65	2020	1240	2	<0.01	<0.001	0.102	<0.0001	<0.001	<0.001	0.023	0.556	<0.001	0.002	<0.005	0.05	0.16	4.01	0.03	<0.01	23.2	23.4	0.29
	21/08/2023	7.99	2290	1390	24	<0.01	0.001	0.061	<0.0001	<0.001	<0.001	0.02	0.208	0.002	<0.001	<0.005	0.09	0.31	1.73	0.15	<0.01	26	26.6	1.25
Wol1	22/02/2023	7.21	656	390	53	<0.01	<0.001	0.015	<0.0001	0.001	<0.001	0.002	0.007	<0.001	<0.001	0.021	<0.05	<0.05	0.08	0.01	2.12	6.87	6.96	0.69
	21/08/2023	7.21	660	398	52	<0.01	<0.001	0.019	<0.0001	<0.001	<0.001	0.003	0.003	0.001	<0.001	0.008	<0.05	<0.05	<0.01	<0.01	2.09	6.93	7.08	1.03
Bas1	22/02/2023	6.97	523	324	12	<0.01	<0.001	0.001	<0.0001	0.005	<0.001	0.002	0.036	<0.001	<0.001	<0.005	<0.05	<0.05	<0.01	<0.01	0.01	5.69	5.74	0.47
	21/08/2023	6.86	507	302	32	<0.01	<0.001	0.03	<0.0001	0.001	<0.001	0.002	2.31	<0.001	<0.001	0.007	<0.05	<0.05	<0.01	<0.01	<0.01	5.28	5.57	2.69
Whan	22/02/2023	7.23	302	195	7	<0.01	<0.001	0.014	<0.0001	0.003	<0.001	0.002	0.001	<0.001	<0.001	0.009	<0.05	<0.05	<0.01	<0.01	0.27	3.3	3.36	0.97
	21/08/2023	7.28	301	193	3	<0.01	<0.001	0.015	<0.0001	<0.001	<0.001	0.001	0.036	<0.001	<0.001	<0.005	<0.05	<0.05	0.03	<0.01	0.13	3.28	3.33	0.83
School raw	22/02/2023	7.18	392	250	6	<0.01	<0.001	0.013	<0.0001	<0.001	<0.001	0.002	0.002	<0.001	<0.001	0.021	<0.05	<0.05	<0.01	<0.01	1.31	3.94	4.17	2.8
	21/08/2023	7.24	193	125	5	<0.01	<0.001	0.012	<0.0001	0.002	<0.001	0.001	<0.001	<0.001	<0.001	0.162	<0.05	<0.05	<0.01	<0.01	1.76	1.92	1.84	----
School filt	22/02/2023	7.94	20	10	<1	<0.01	<0.001	<0.001	<0.0001	0.008	<0.001	<0.001	<0.001	<0.001	<0.001	<0.005	<0.05	<0.05	0.02	0.03	0.27	0.18	0.2	----
	21/08/2023	7.29	15	<10	<1	<0.01	<0.001	<0.001	<0.0001	0.059	<0.001	<0.001	0.001	<0.001	<0.001	<0.005	<0.05	<0.05	0.02	0.01	0.31	0.19	0.09	----
GW006567	22/02/2023	8.03	2360	1380	65	<0.01	<0.001	0.095	<0.0001	<0.001	<0.001	0.01	0.094	0.002	<0.001	<0.005	0.06	0.1	0.19	<0.01	0.01	26	26	0.03
	21/08/2023	8.17	2320	1380	82	<0.01	<0.001	0.08	<0.0001	<0.001	<0.001	0.009	0.081	0.002	<0.001	0.006	0.08	0.17	0.18	<0.01	<0.01	24.8	25.8	2

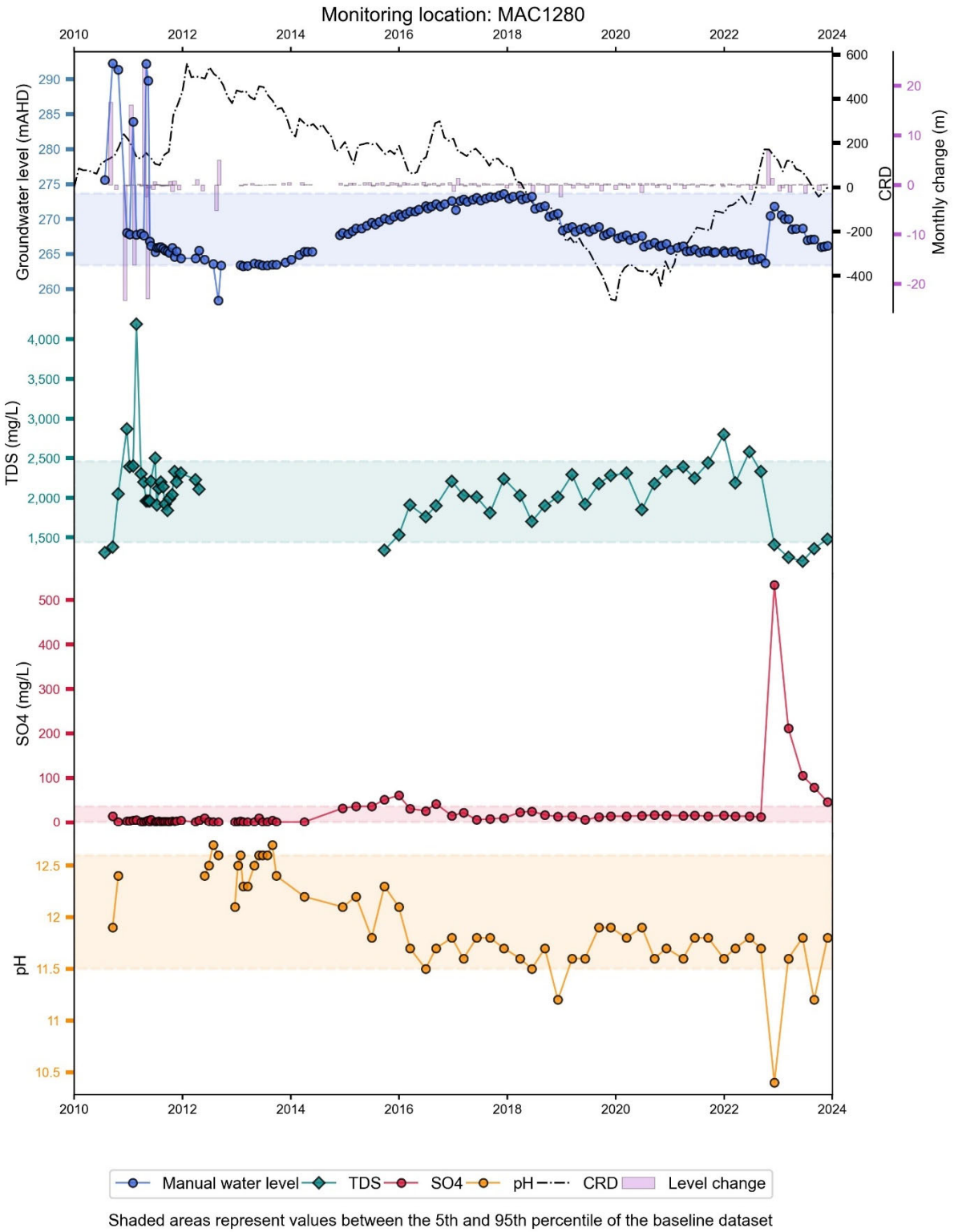
Table E-6

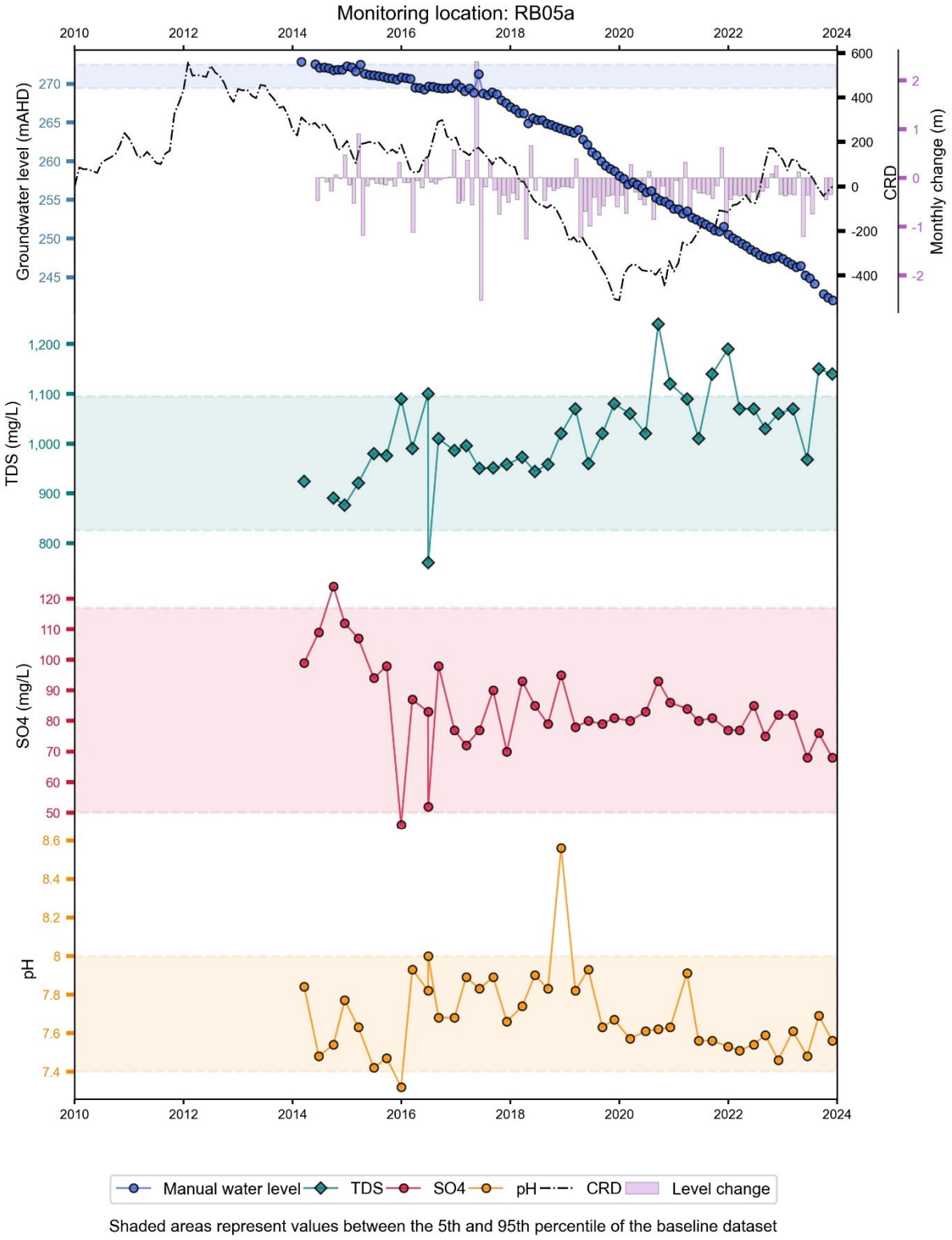
Private Groundwater Bores Levels

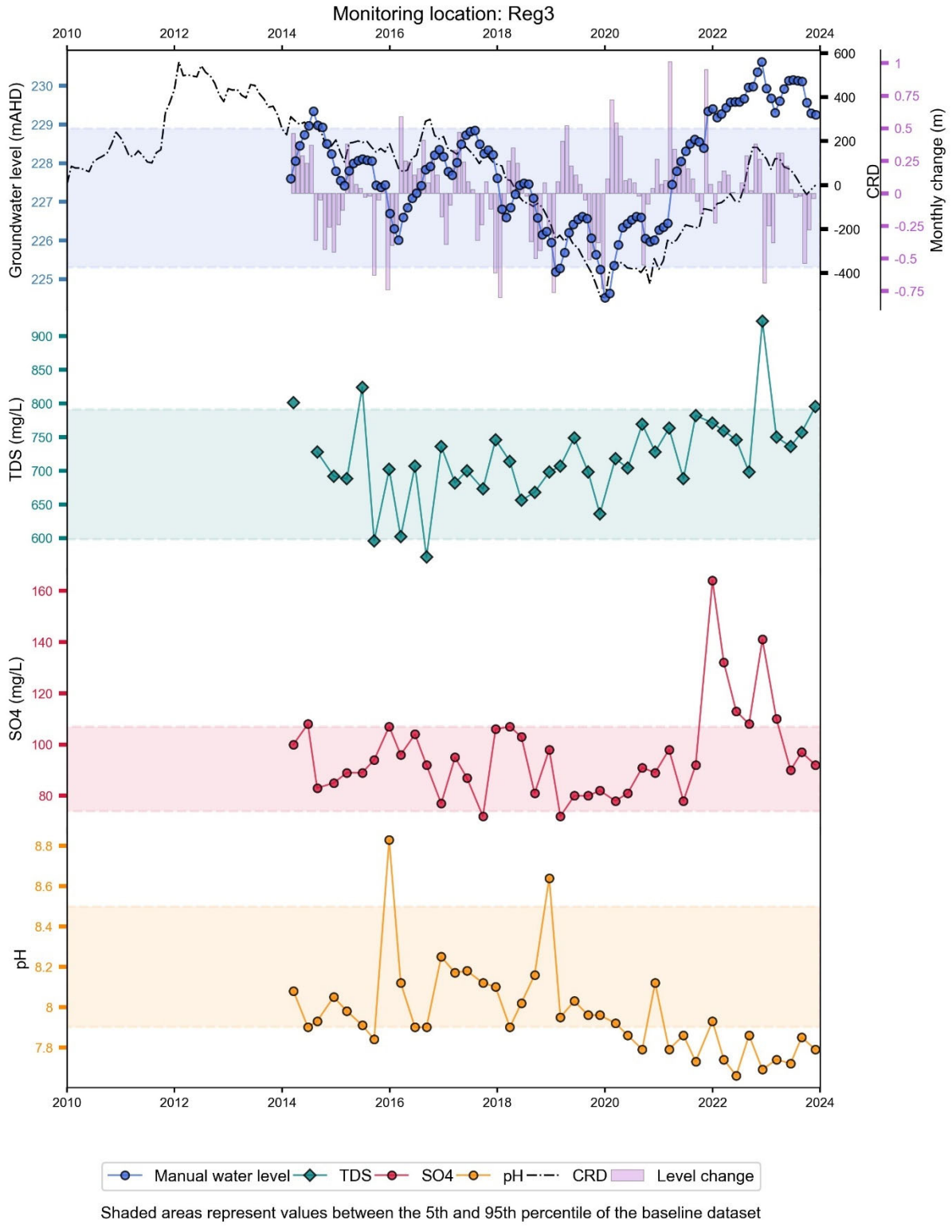
Date	MOR1	MOR2	BRE2	WOL1	WOL2	School	Whan	Tralee	Morse	Bas1	Bas2	Teston
Feb-23	11.68	12.82	12.76	2.26	*Blocked at 5m*	*Tap*	3.46	13.99	19.44	*Tap*	6.82	18.98
Aug-23	11.45	12.61	12.9	2.45	*Blocked at 5m*	*Tap*	3.78	13.92	19.34	*Tap*	8.07	18.88

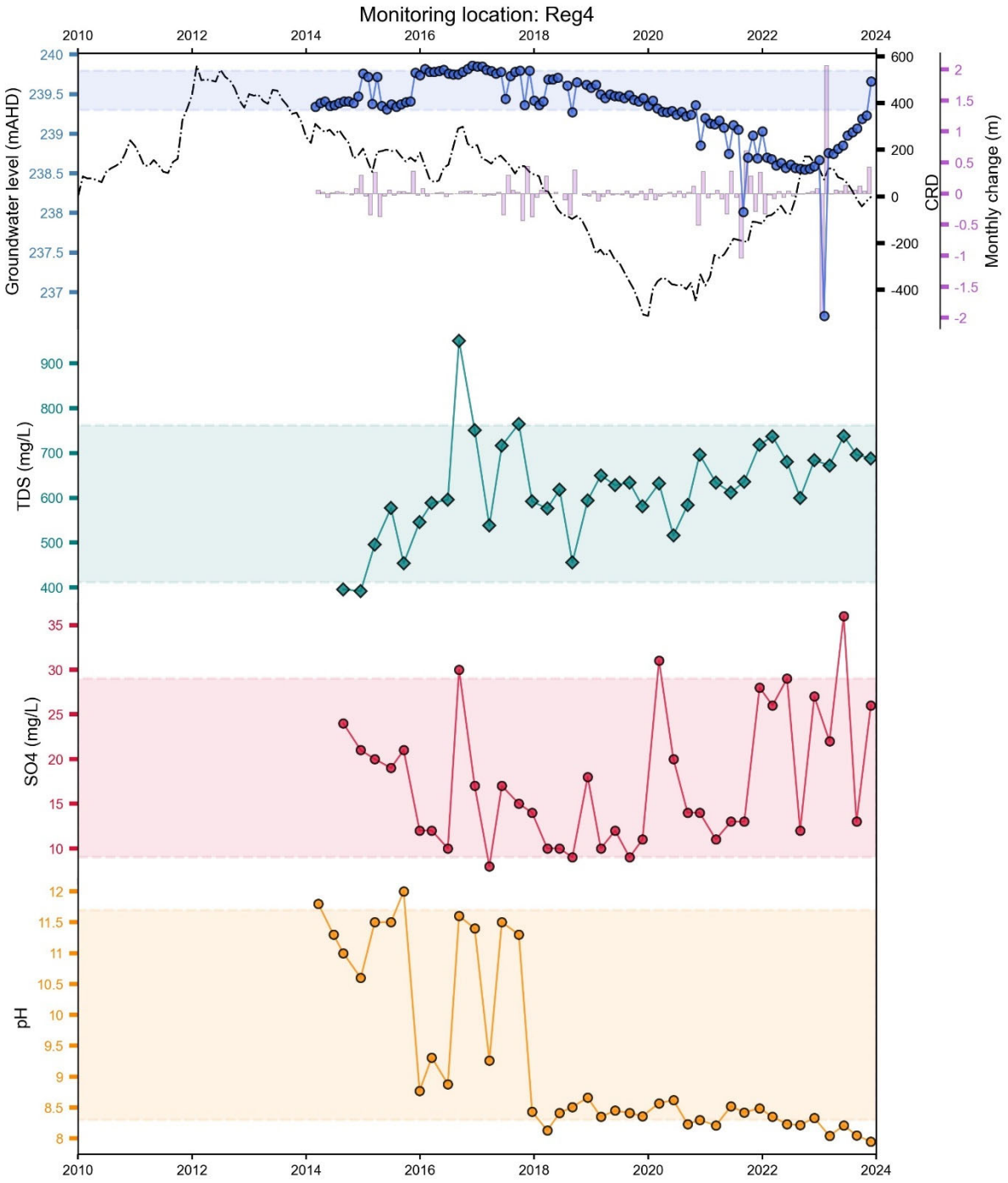
Figure E-1

Stacked Hydrographs

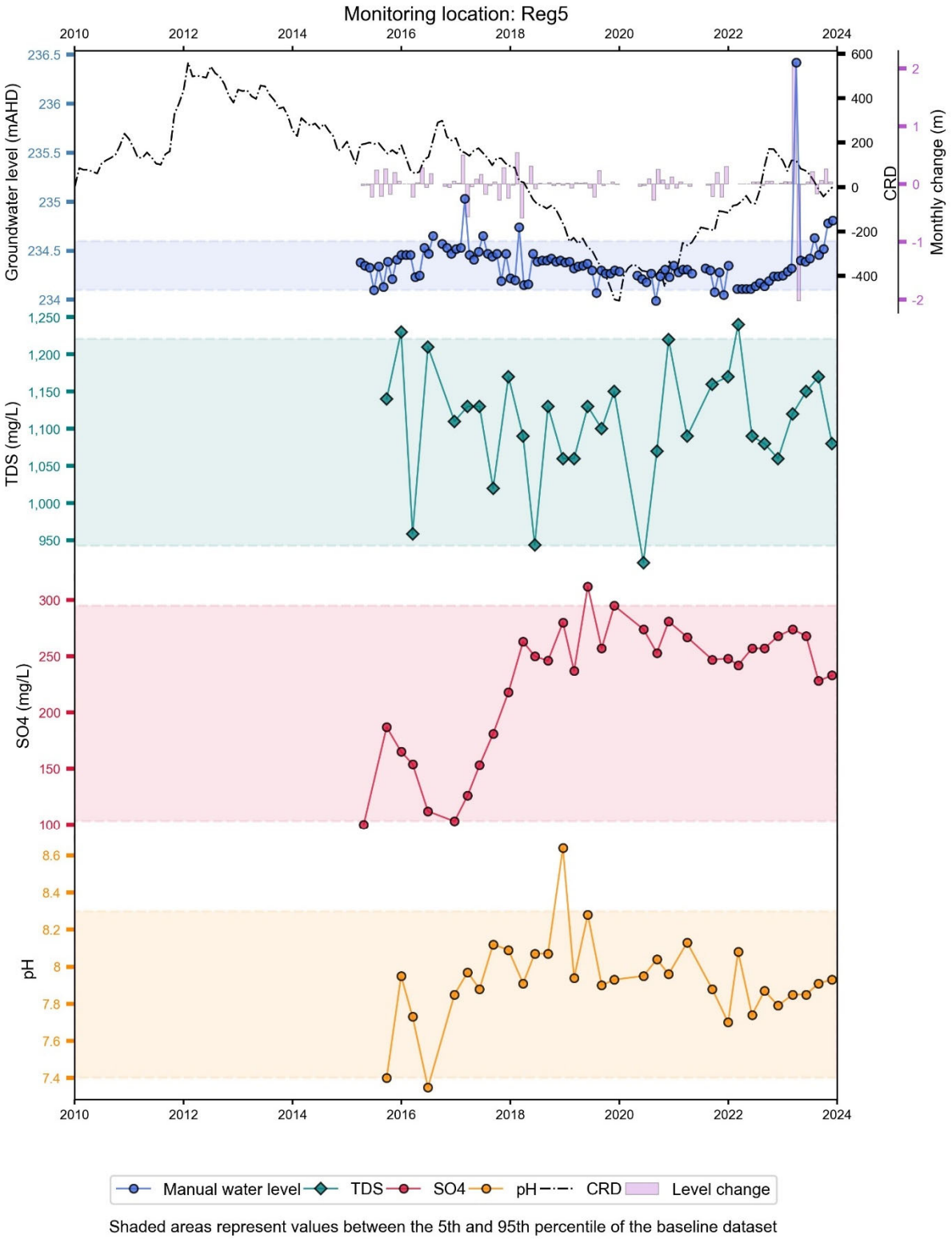



Monitoring location: RB05a
Groundwater level (mAHD)
CRD
Monthly change (m)
TDS (mg/L)
SO4 (mg/L)
pH
Manual water level
TDS
SO4
pH
CRD
Level change
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

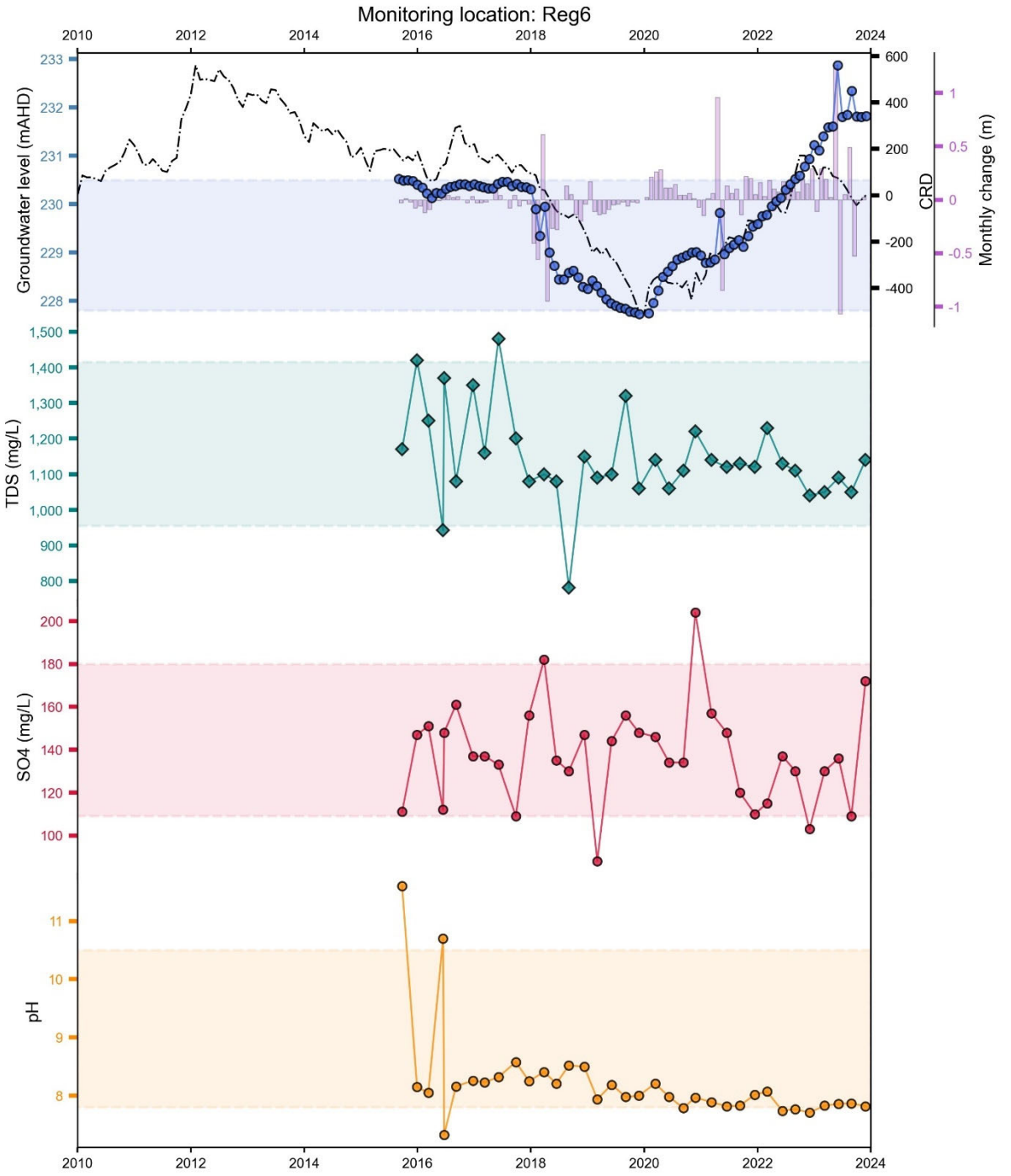

Monitoring location: Reg3
Groundwater level (mAHD)
CRD
Monthly change (m)
TDS (mg/L)
SO4 (mg/L)
pH
Manual water level
TDS
SO4
pH
CRD
Level change
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



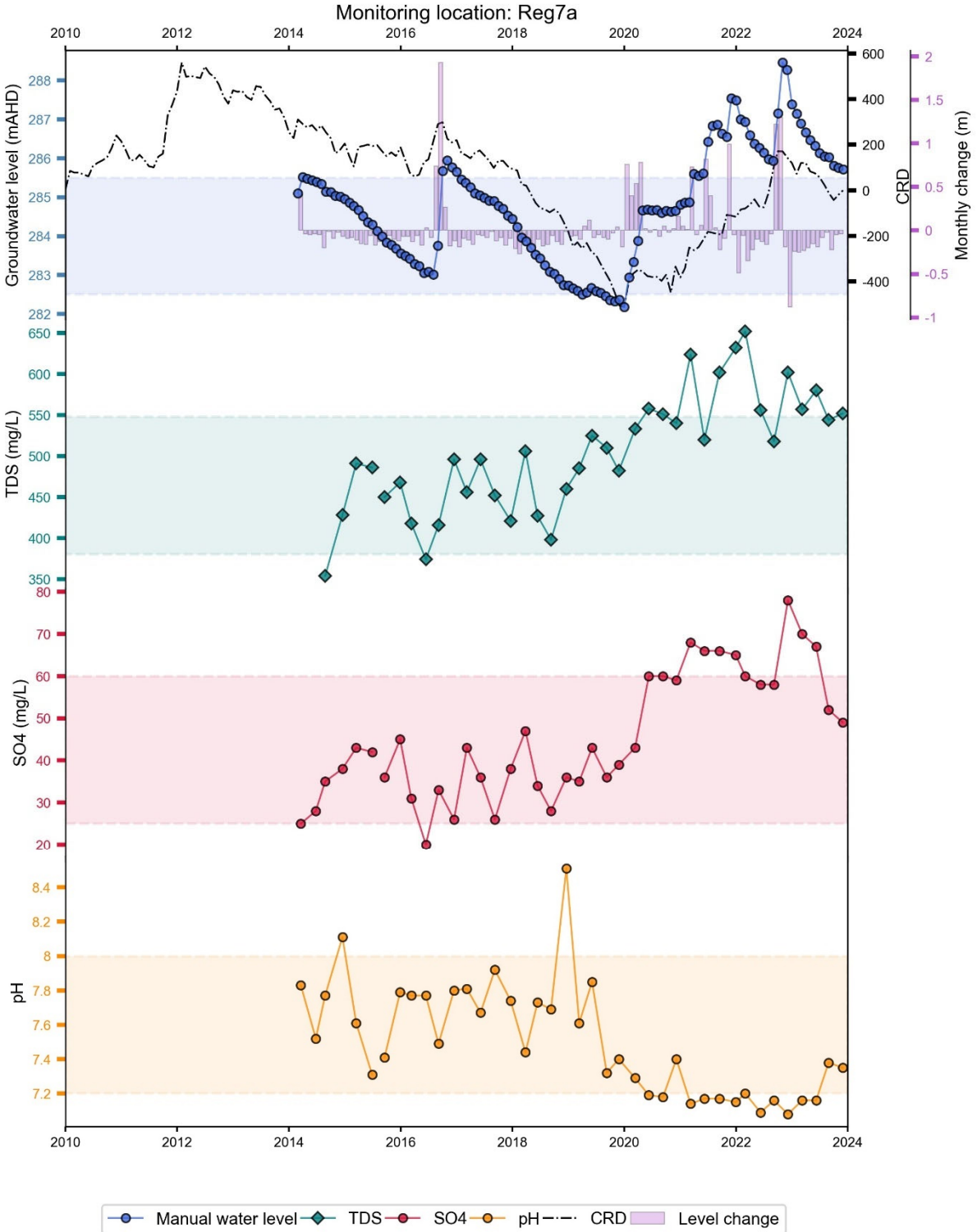
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



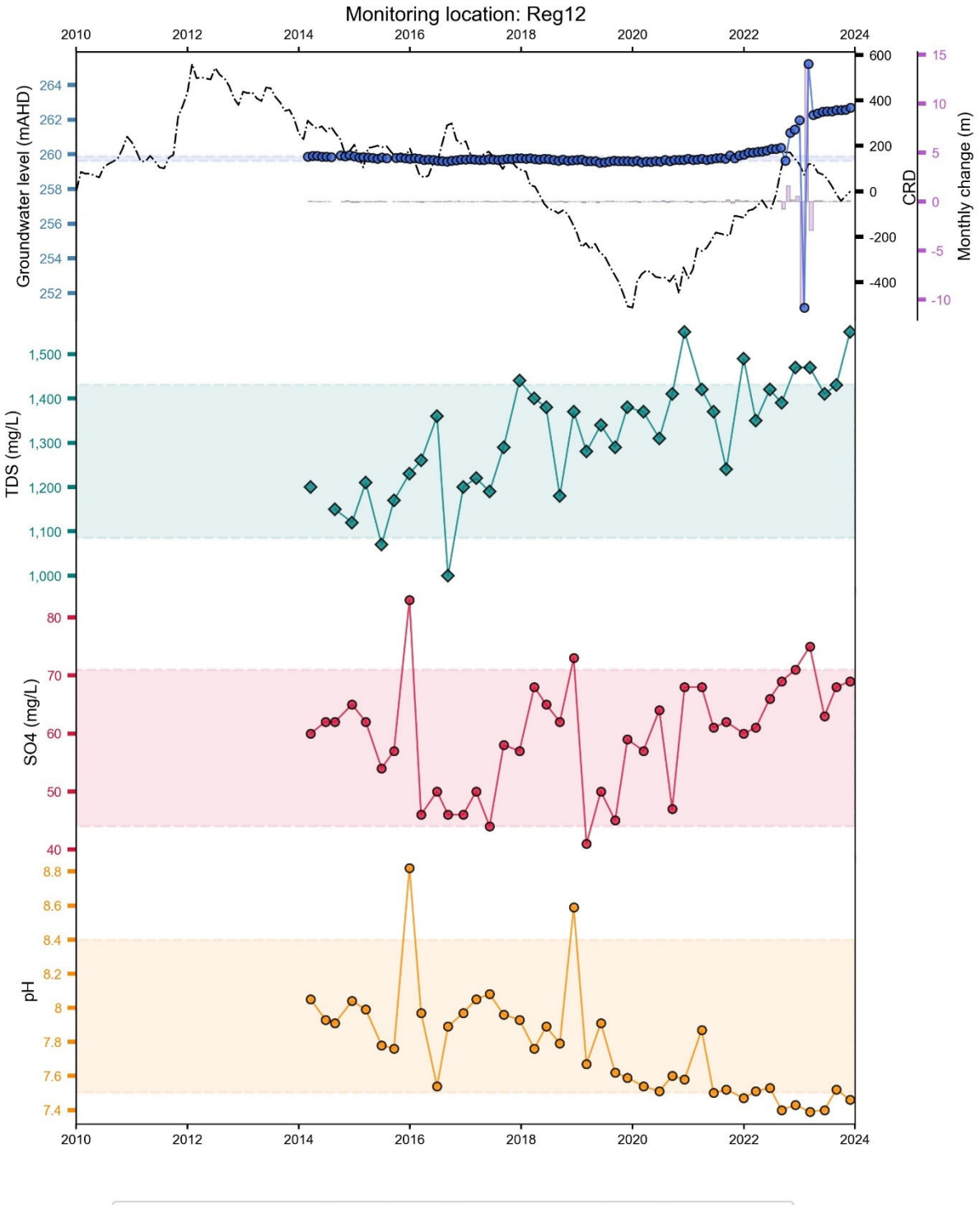
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

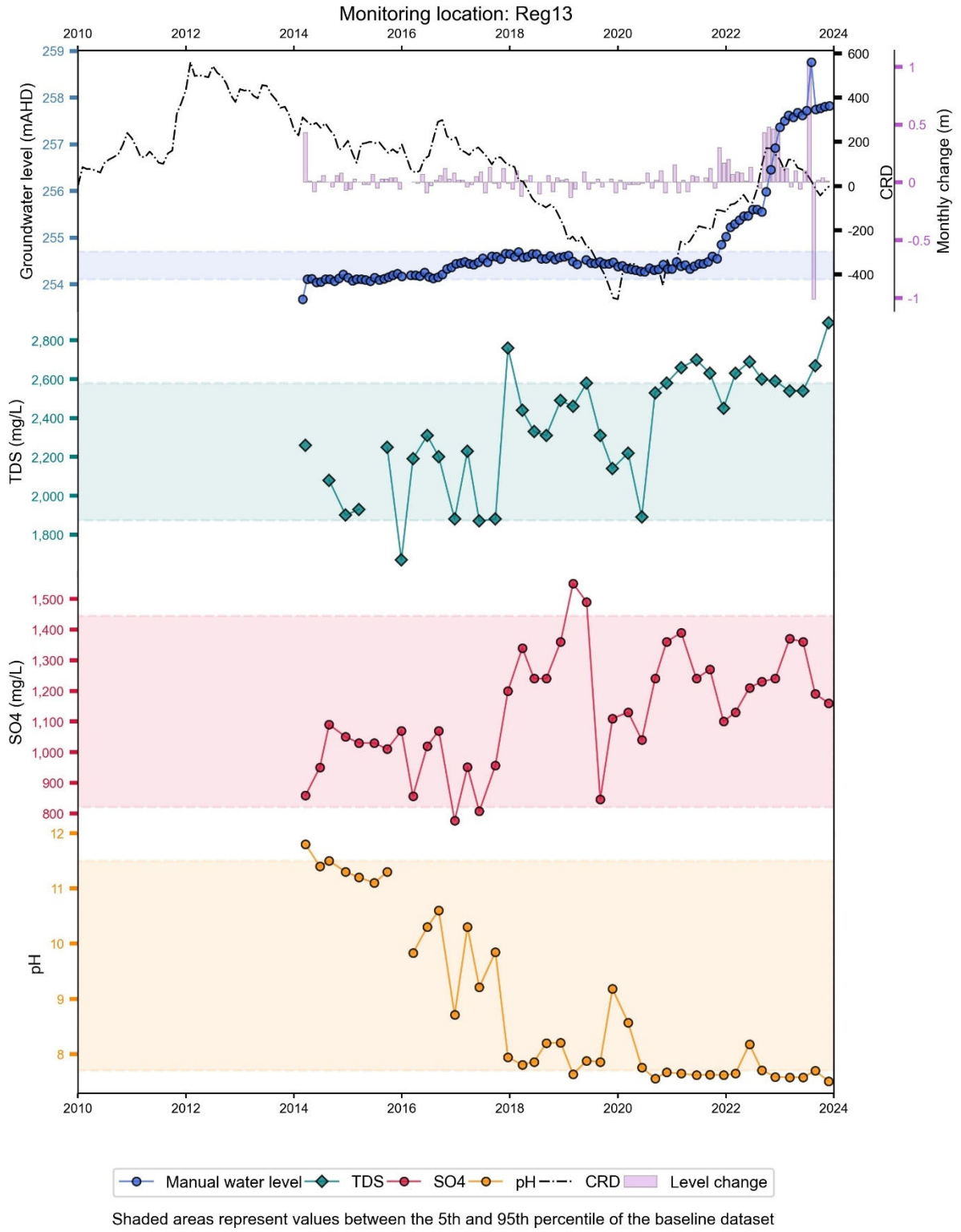


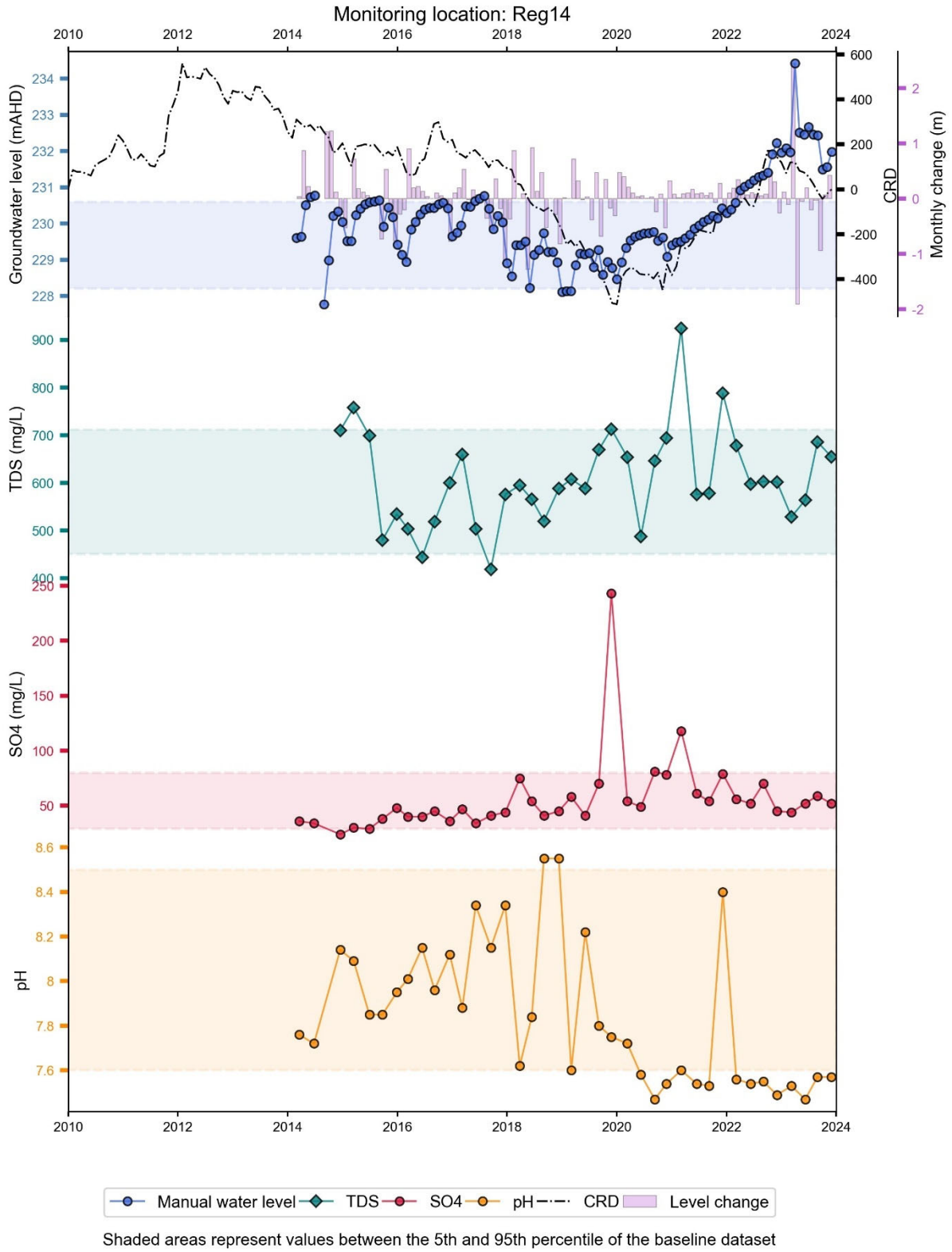
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



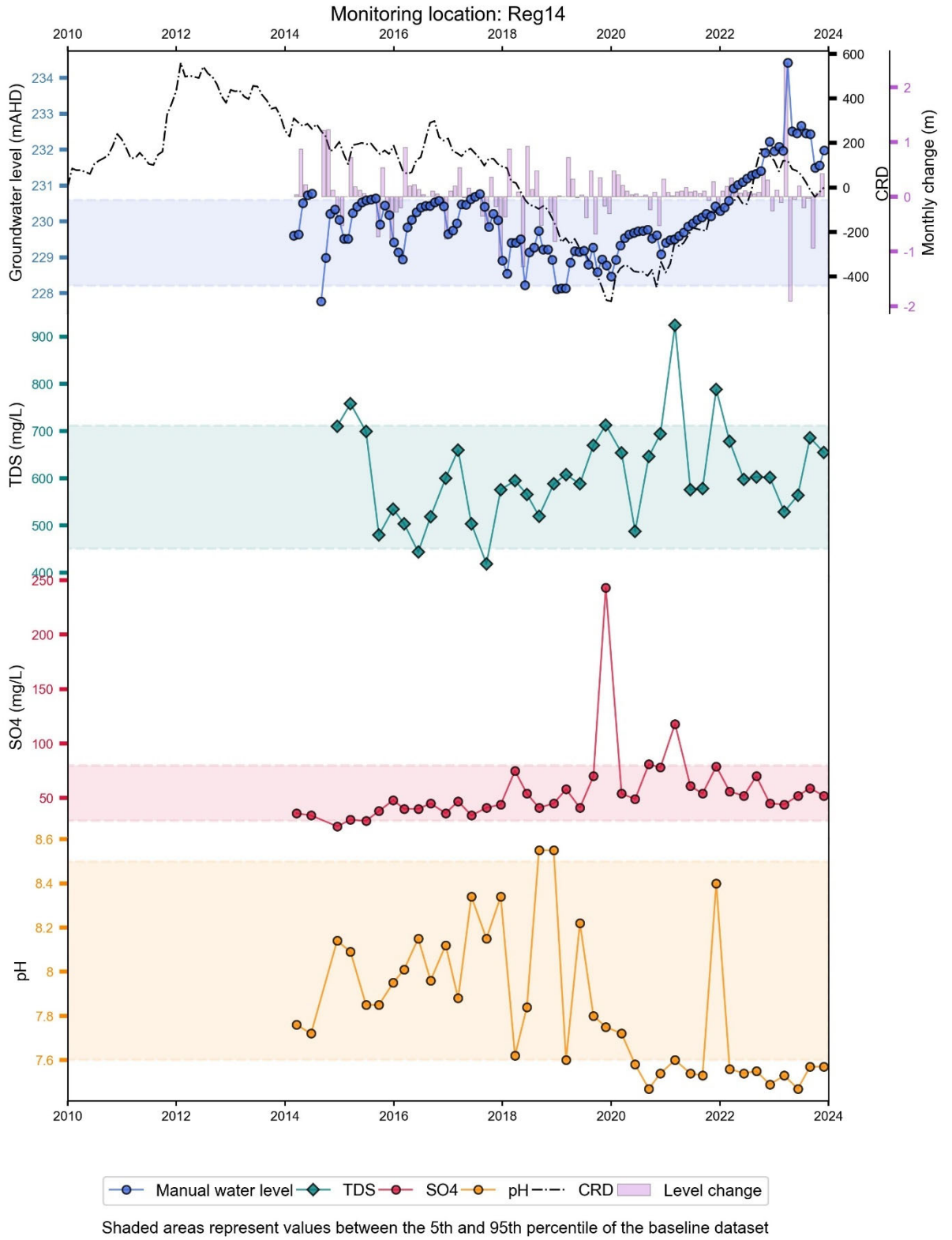
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset


Monitoring location: Reg12
Groundwater level (mAHD)
CRD
Monthly change (m)
TDS (mg/L)
SO4 (mg/L)
pH
Manual water level
TDS
SO4
pH
CRD
Level change
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

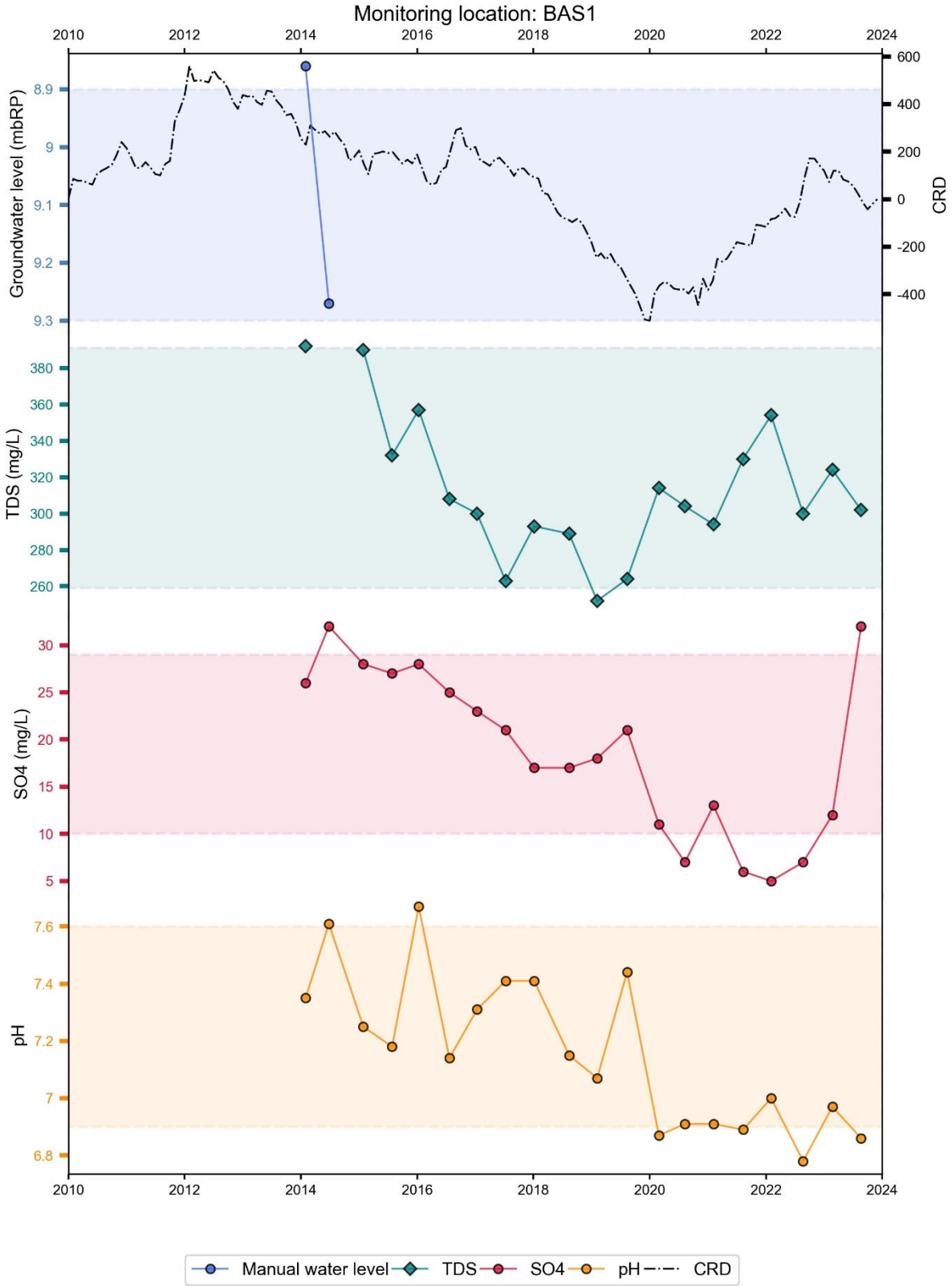

Monitoring location: Reg13
Groundwater level (mAHD)
CRD
Monthly change (m)
TDS (mg/L)
SO4 (mg/L)
pH
Manual water level
TDS
SO4
pH
CRD
Level change
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



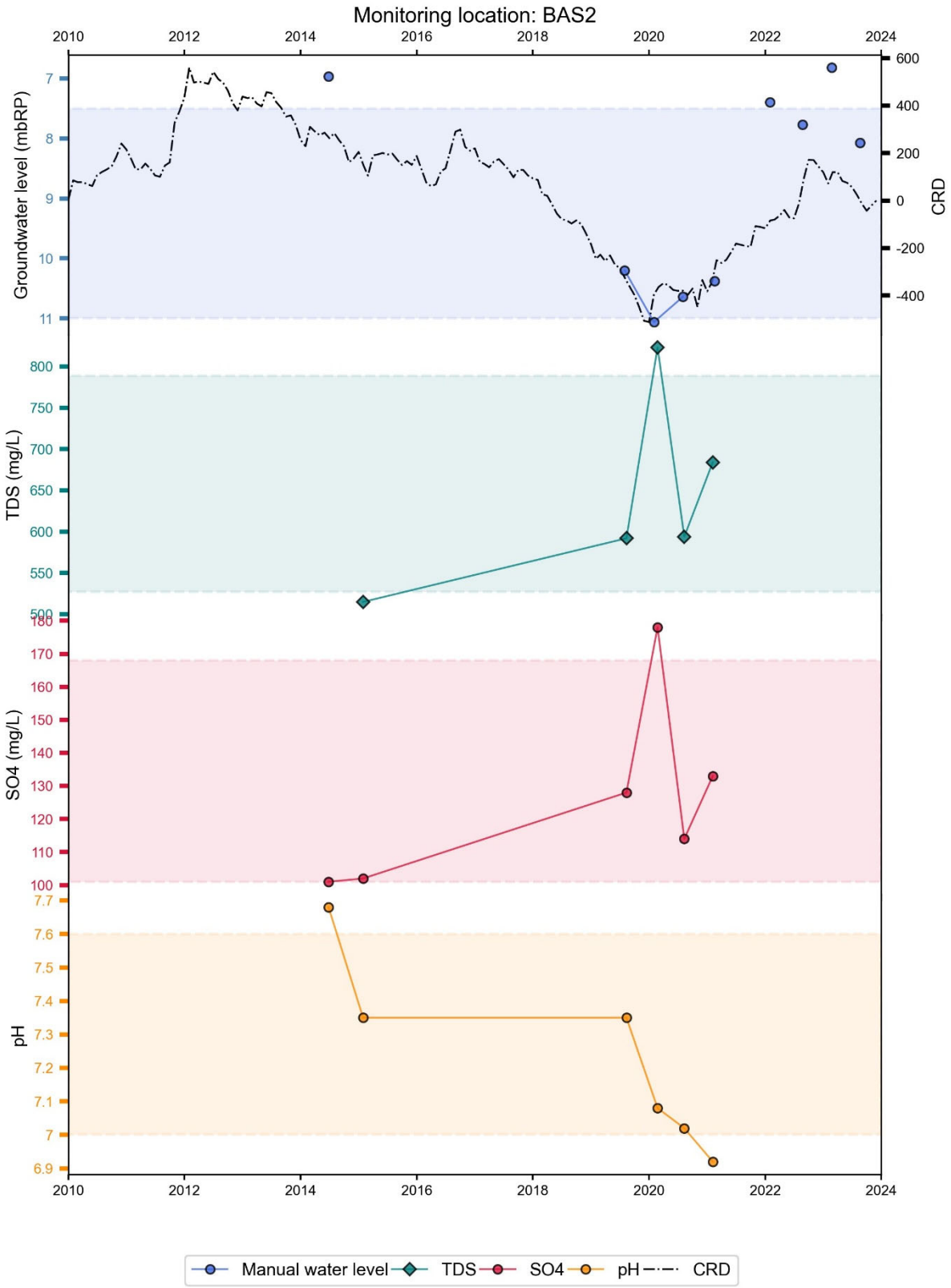
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



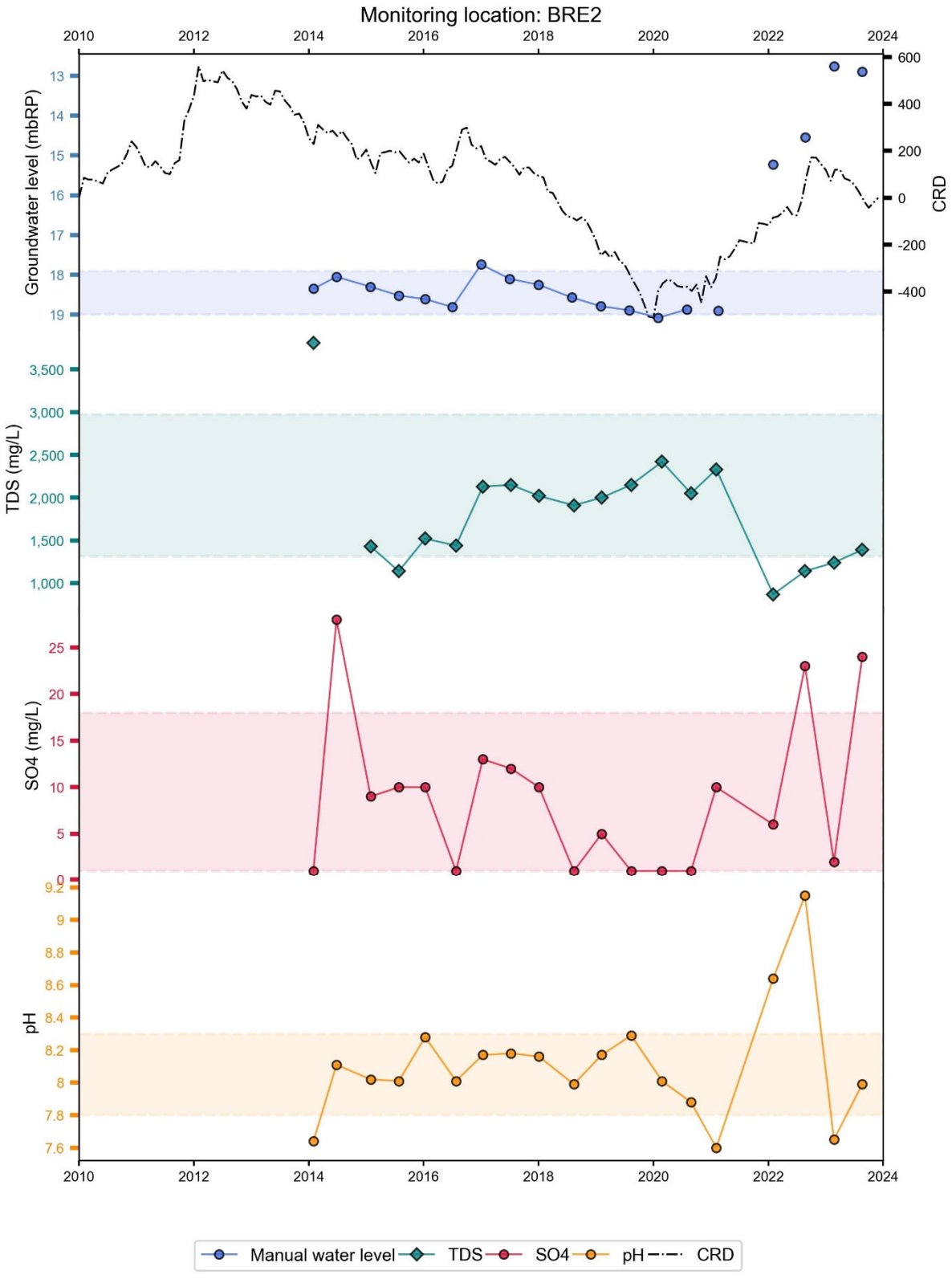
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



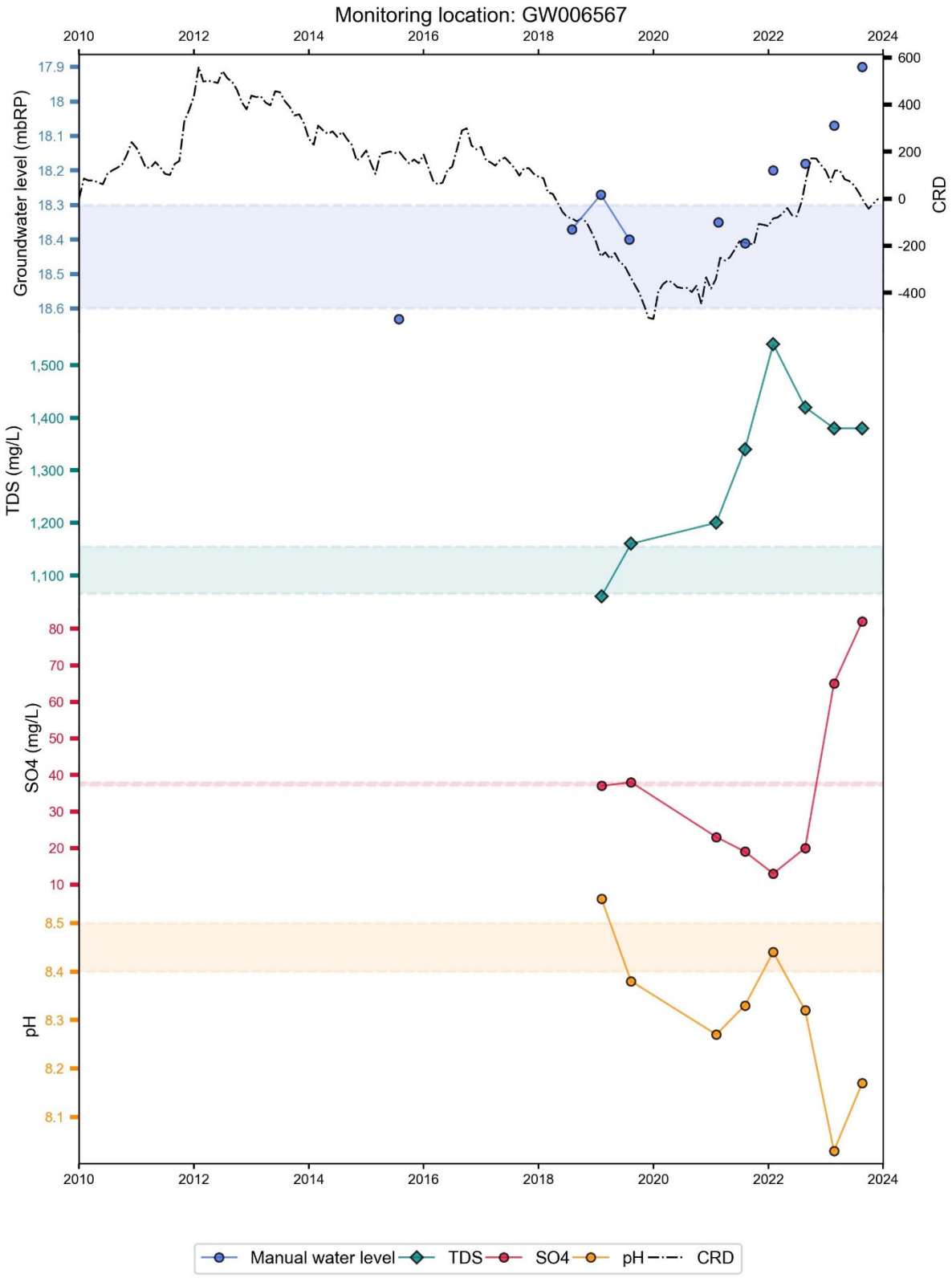
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



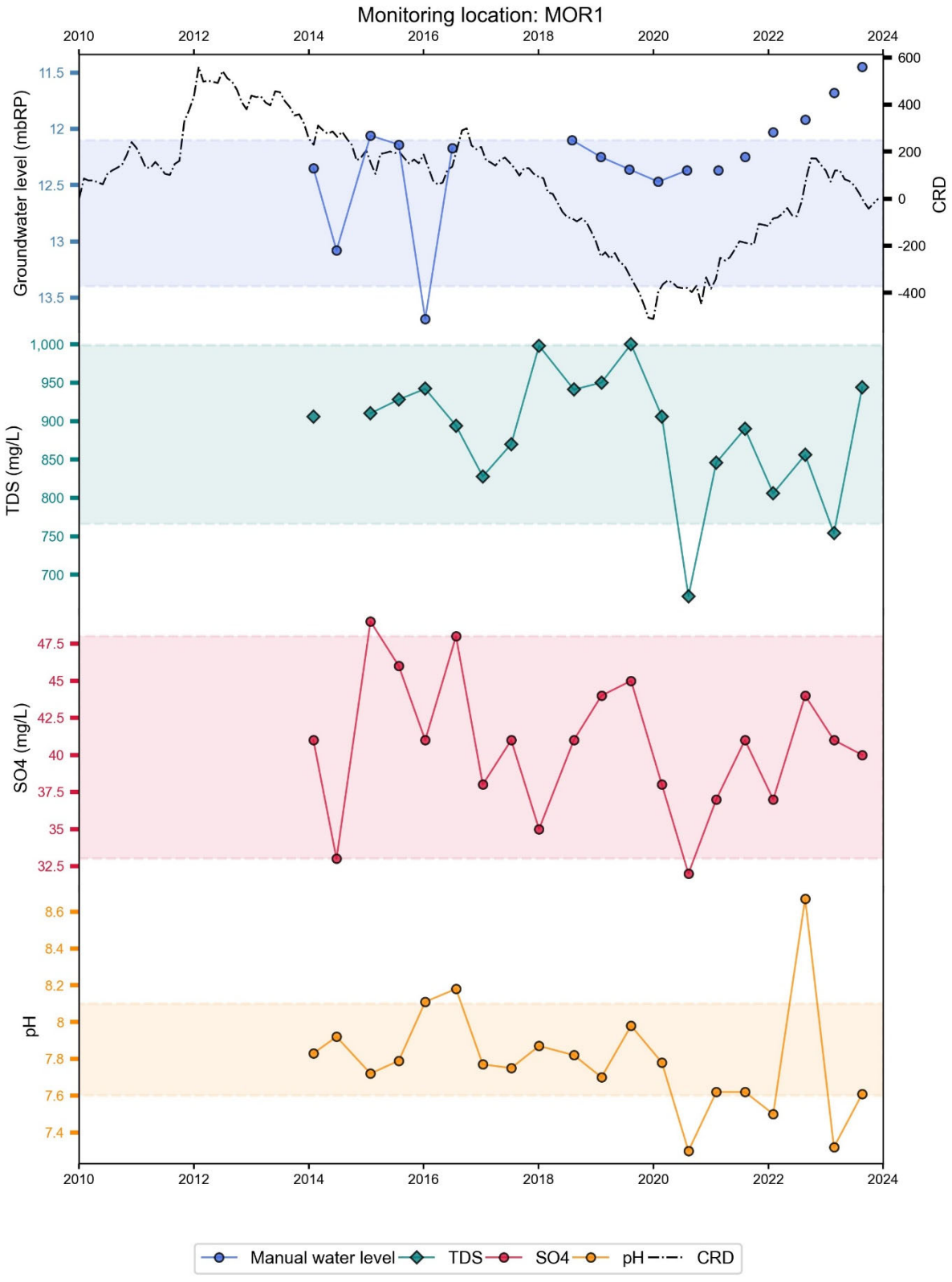
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



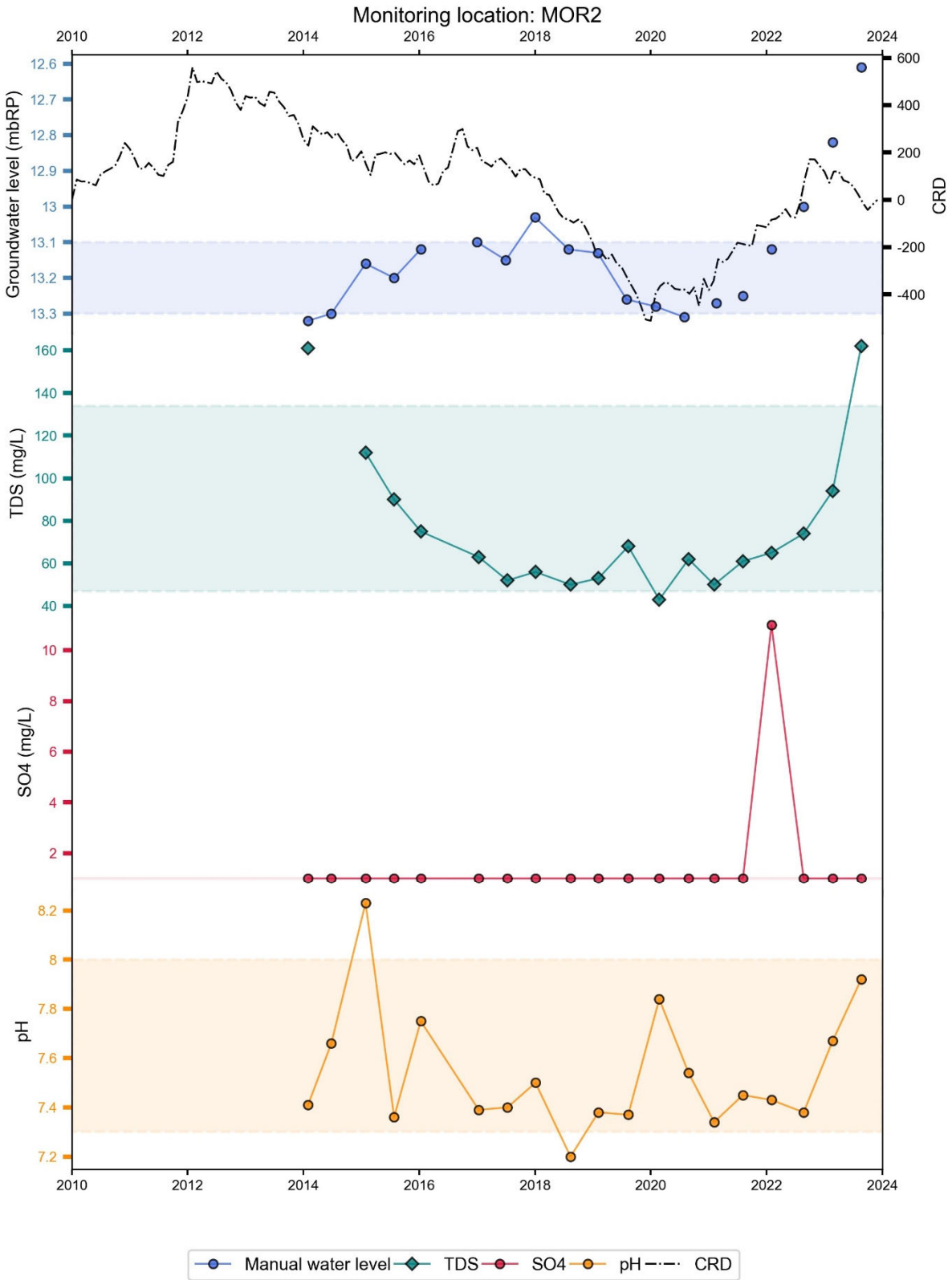
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



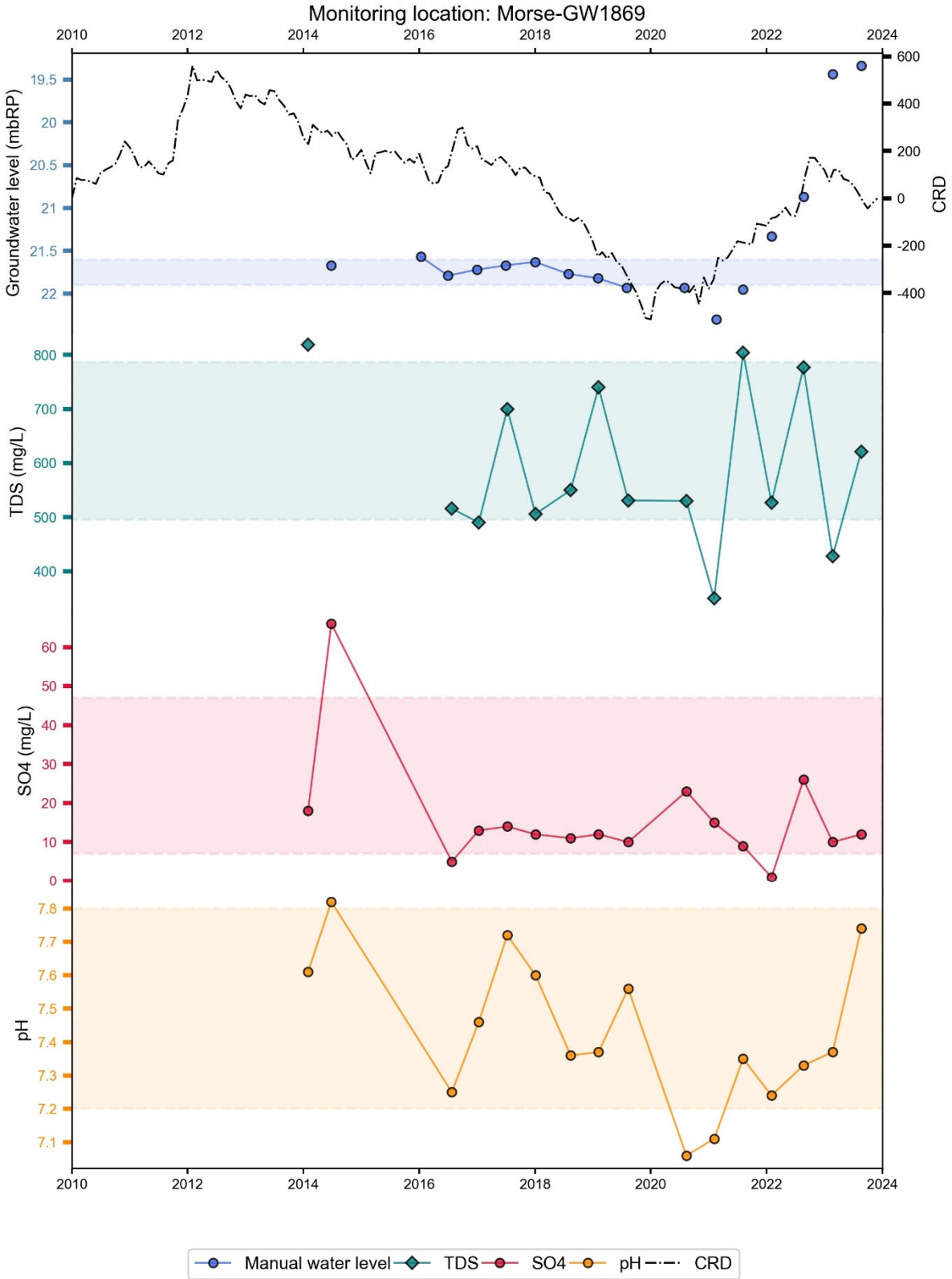
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



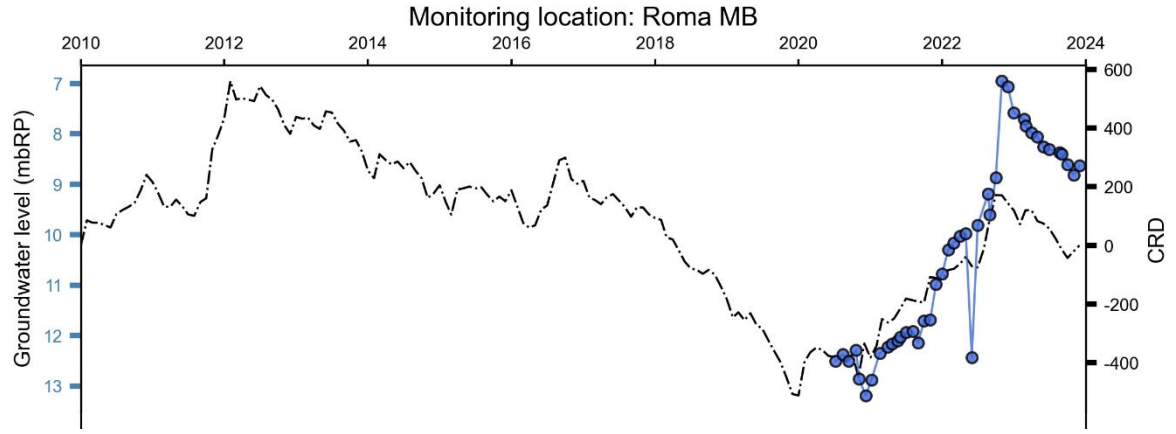
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

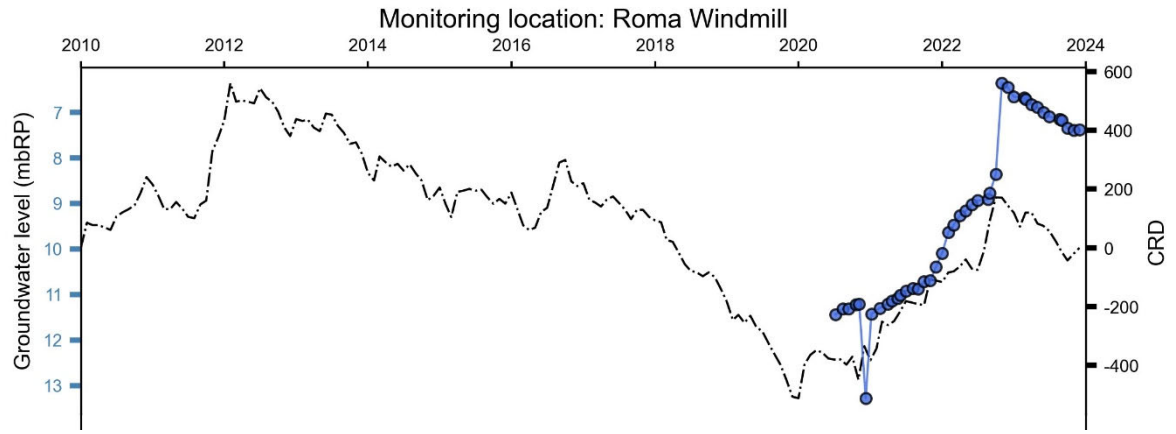


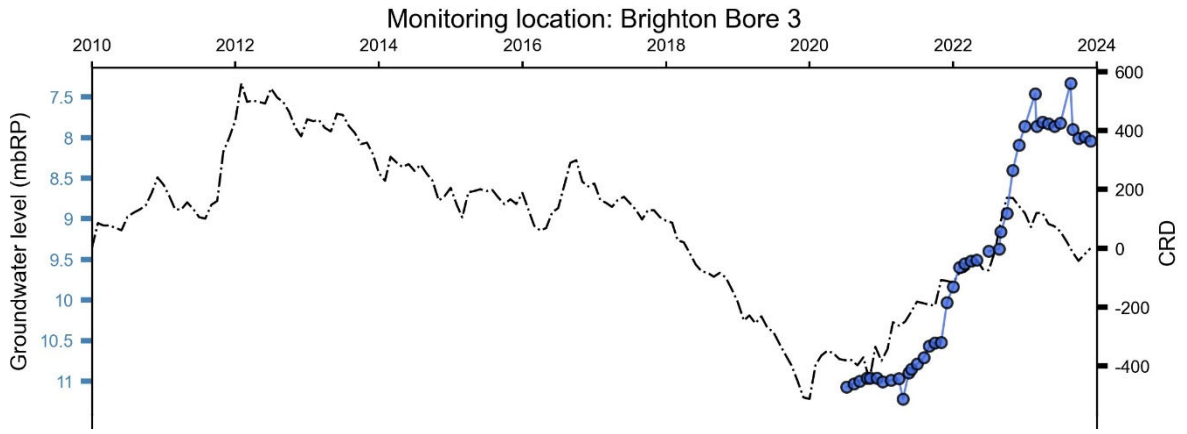
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

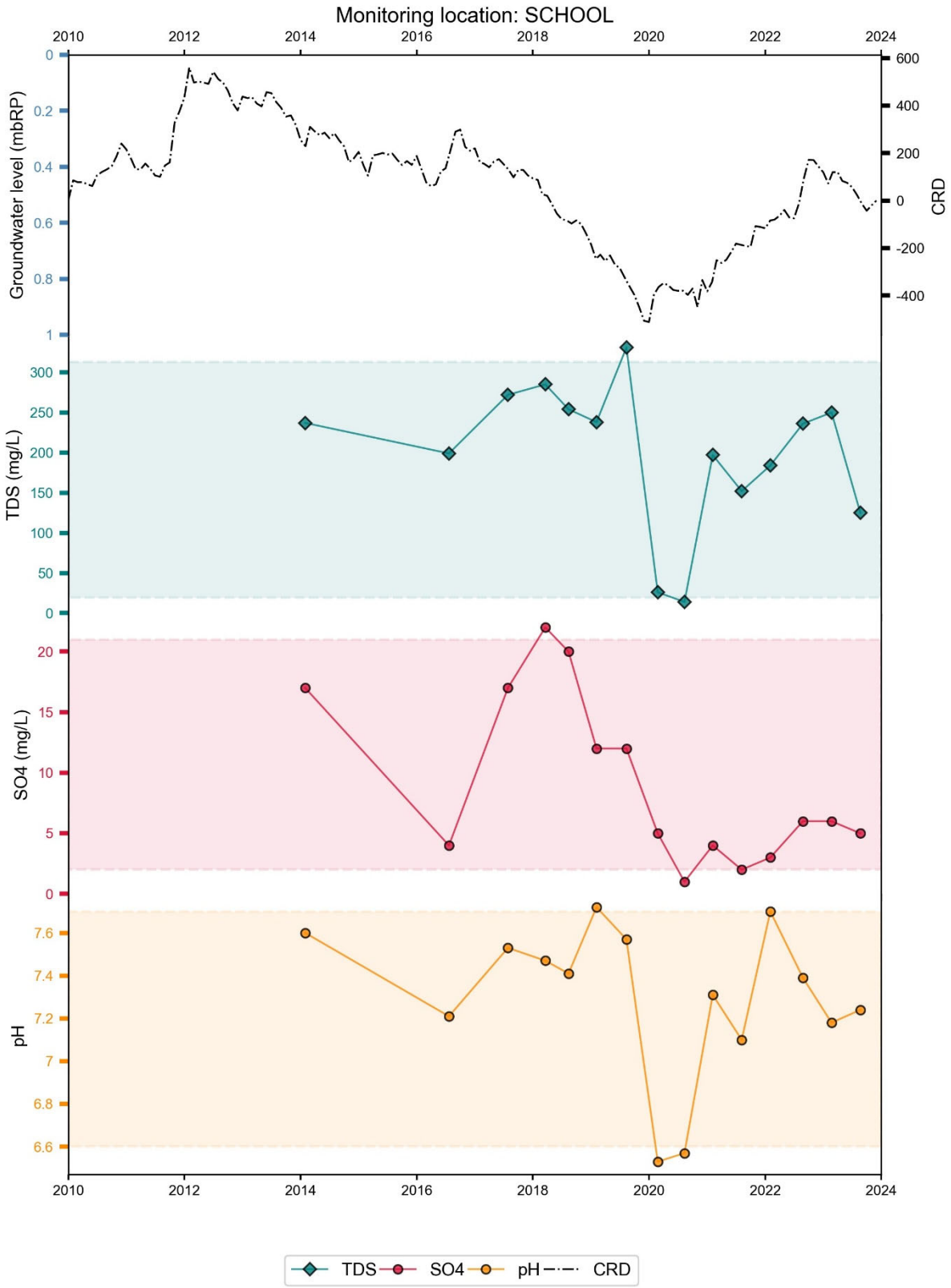


Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

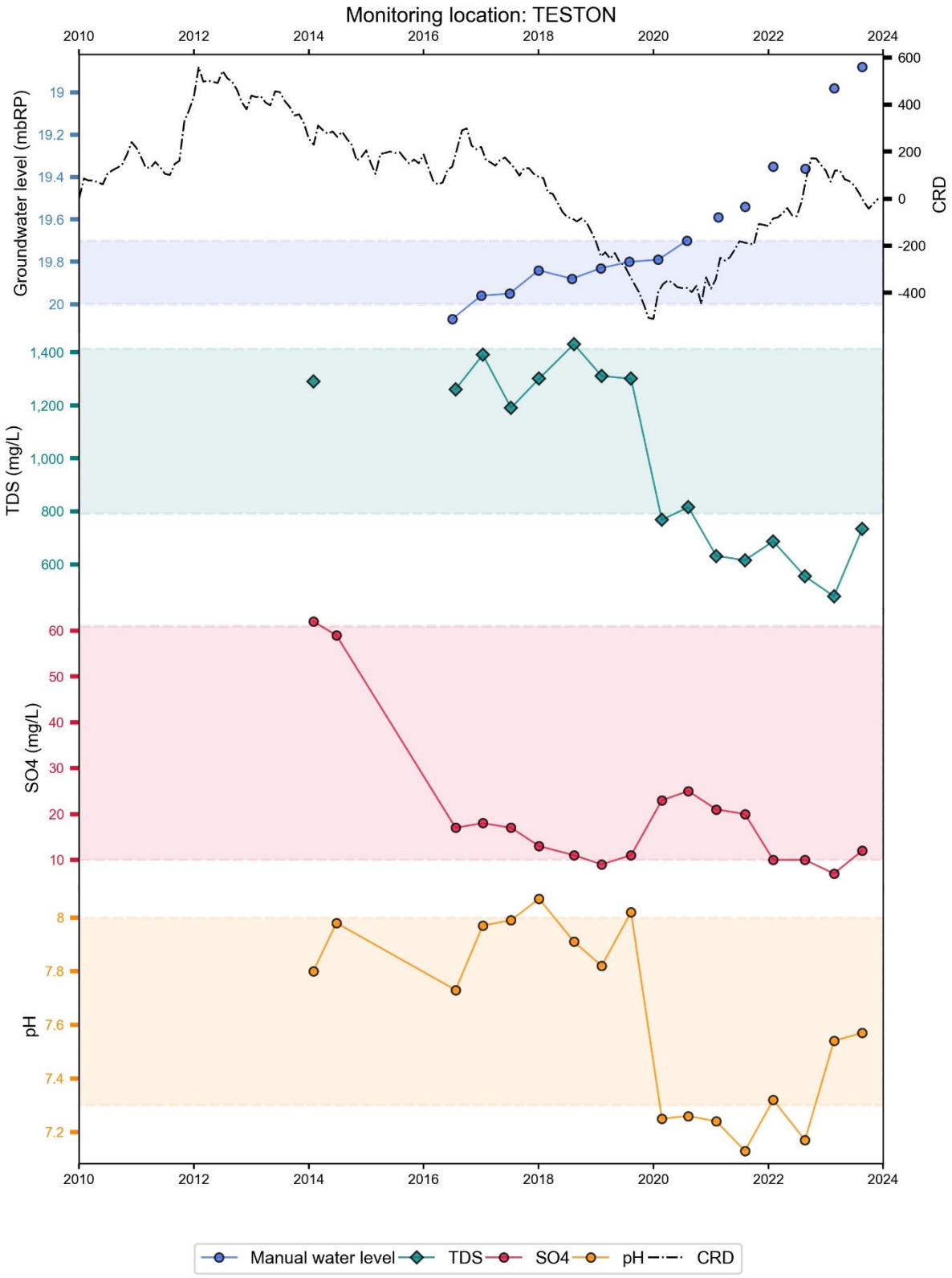

Monitoring location: Roma MB
2010
2012
2014
2016
2018
2020
2022
2024
Groundwater level (mbRP)
7
8
9
10
11
12
13
CRD
600
400
200
0
-200
-400


Monitoring location: Roma Windmill
2010
2012
2014
2016
2018
2020
2022
2024
Groundwater level (mbRP)
7
8
9
10
11
12
13
CRD
600
400
200
0
-200
-400

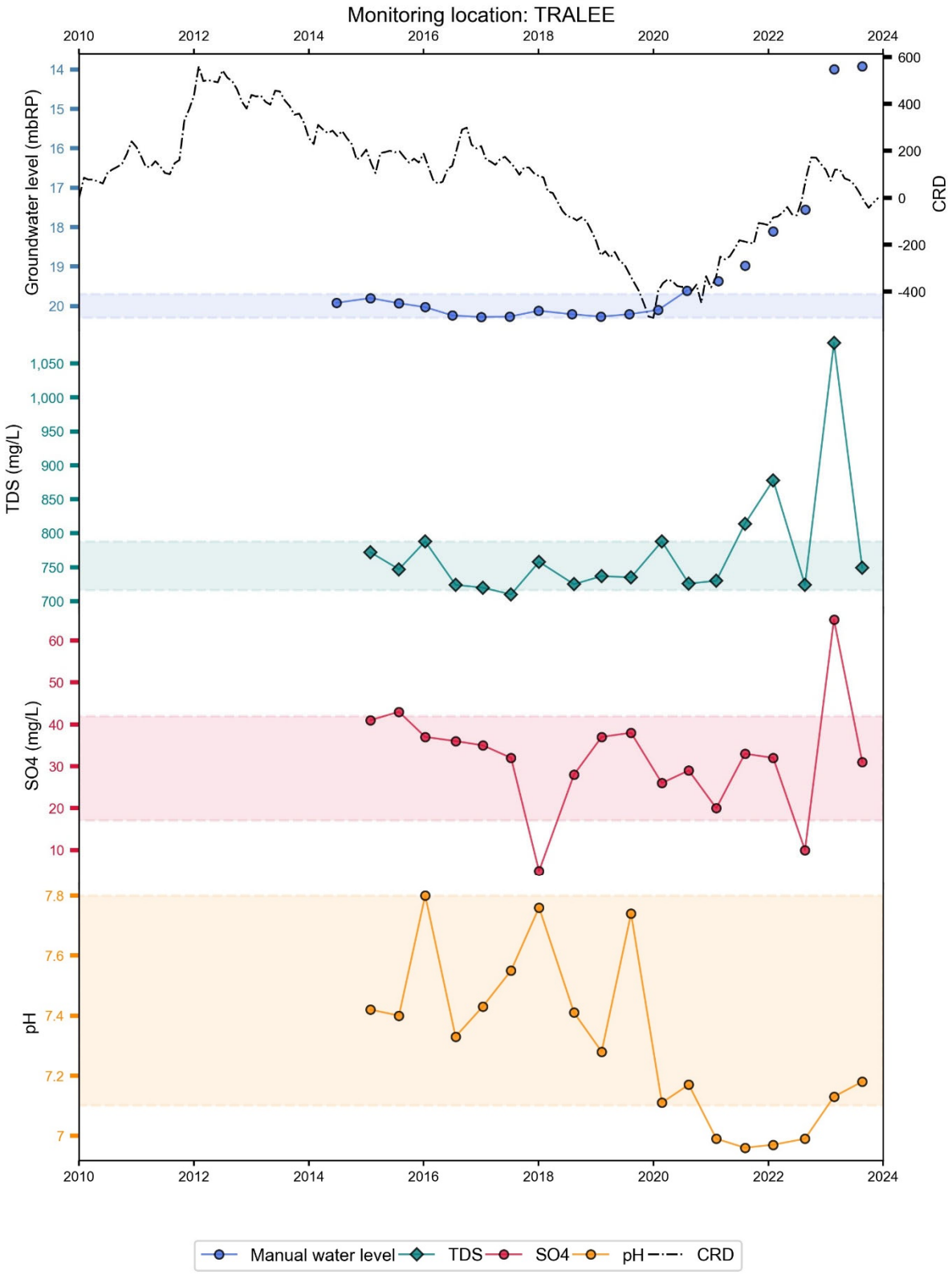

Monitoring location: Brighton Bore 3
2010
2012
2014
2016
2018
2020
2022
2024
Groundwater level (mbRP)
7.5
8
8.5
9
9.5
10
10.5
11
CRD
600
400
200
0
-200
-400



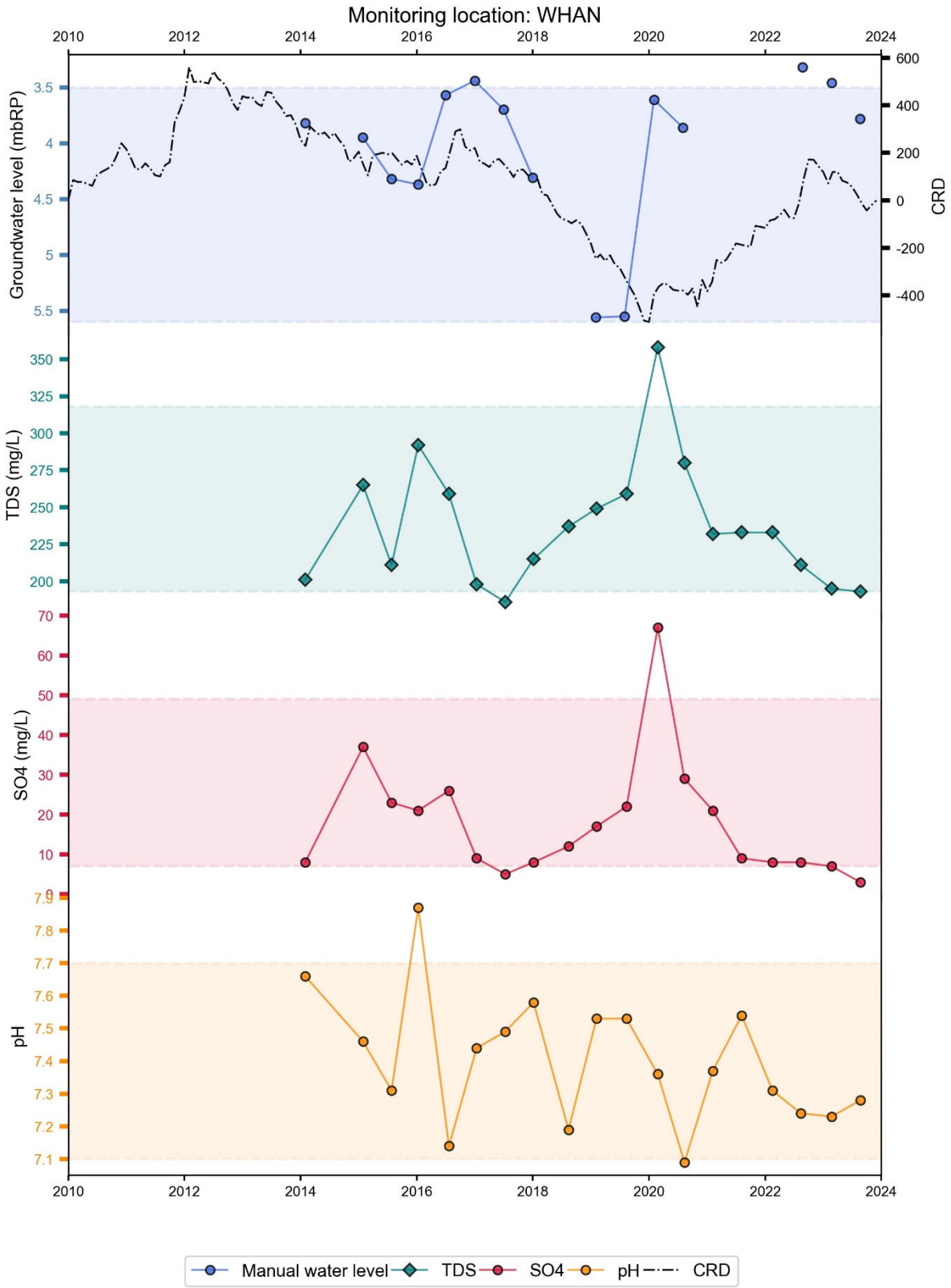
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



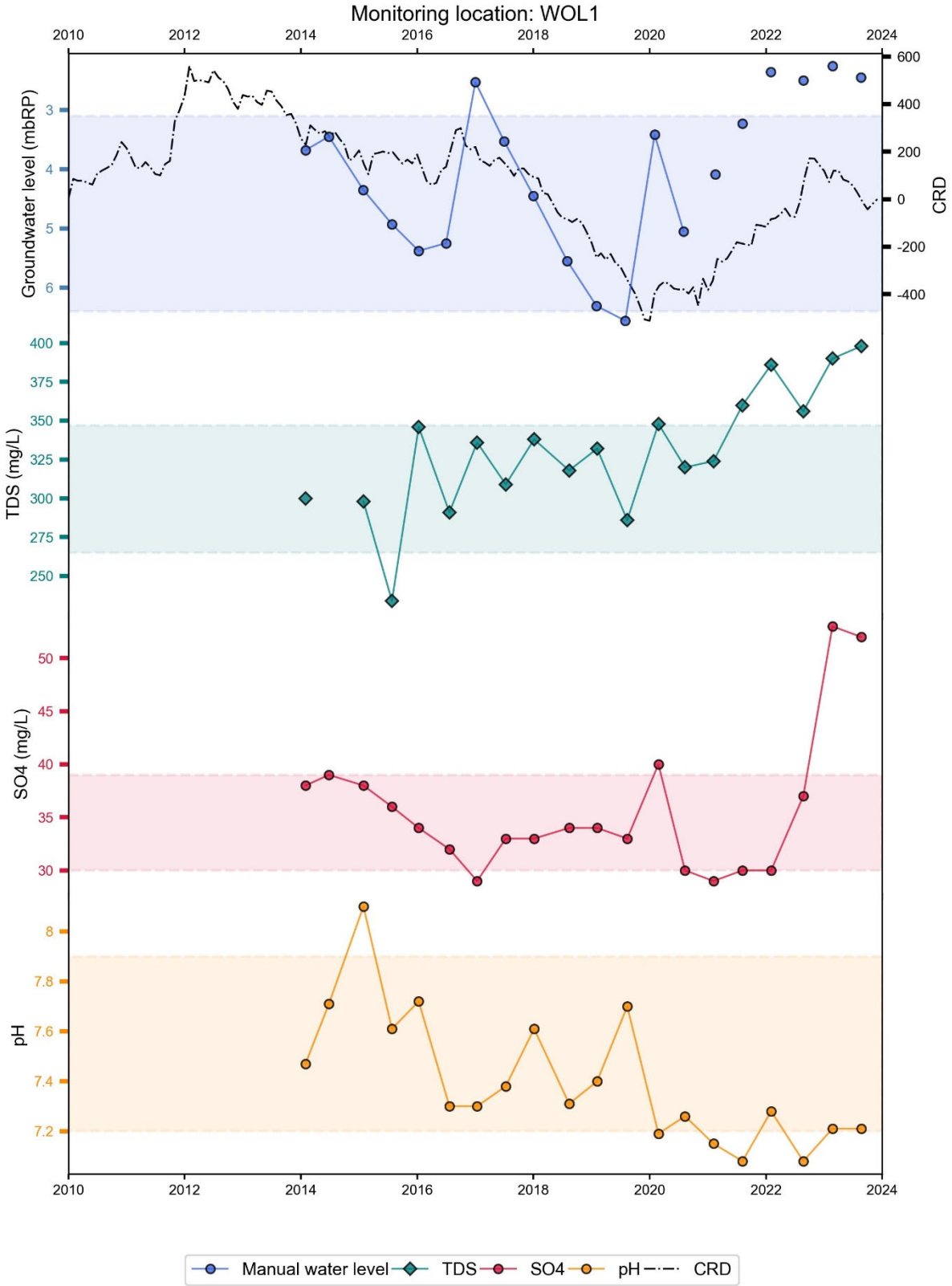
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



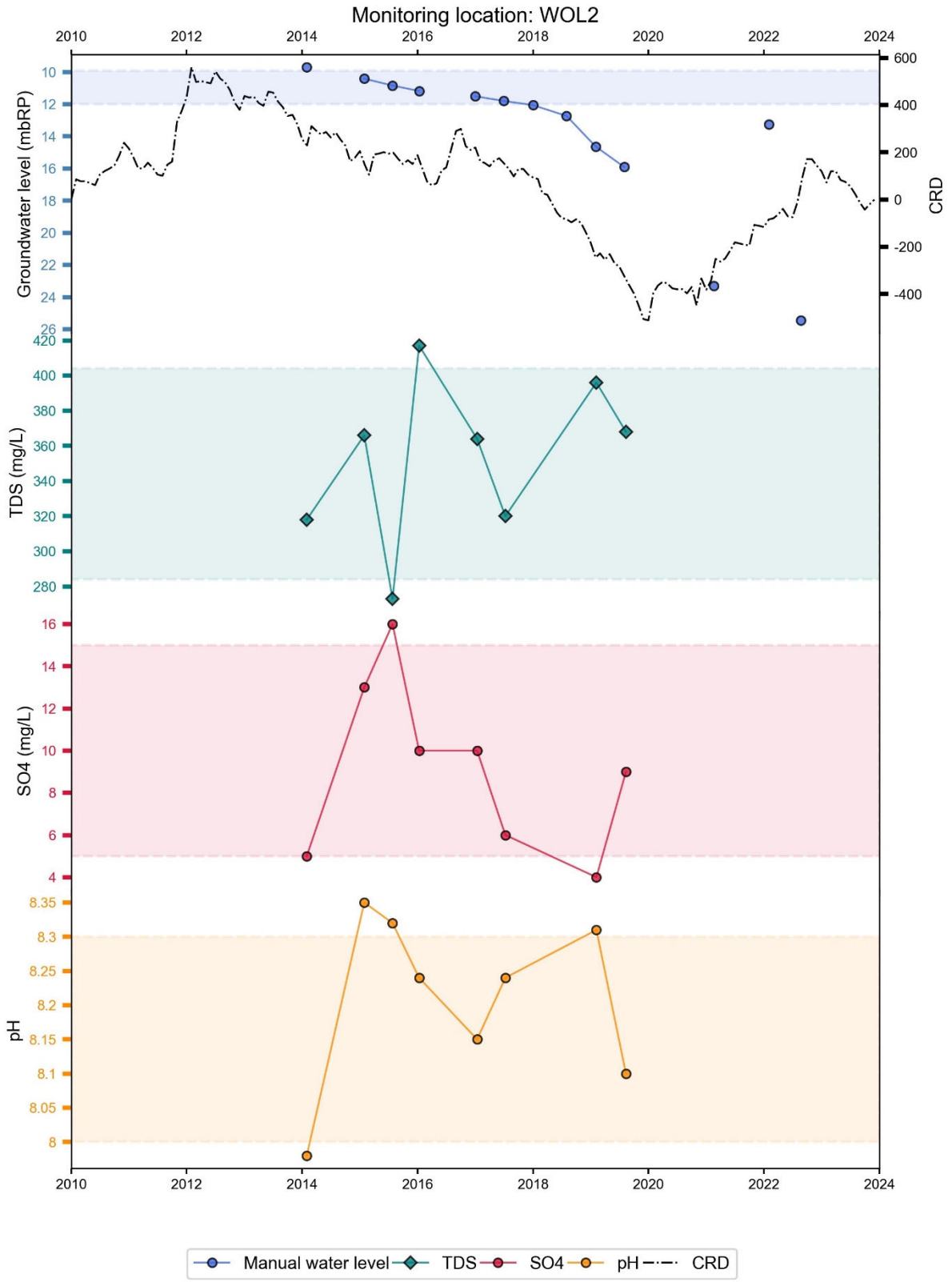
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



Shaded areas represent values between the 5th and 95th percentile of the baseline dataset



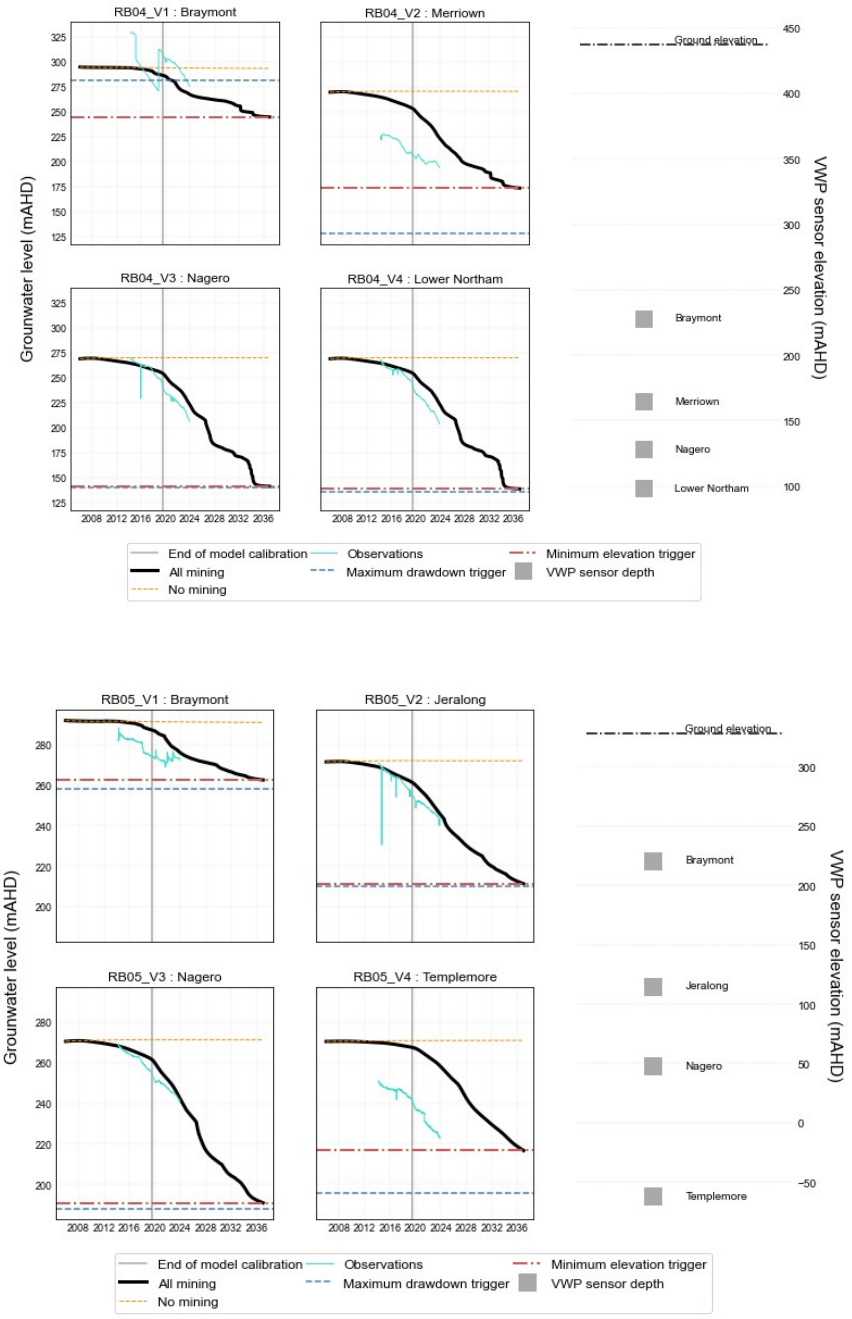
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

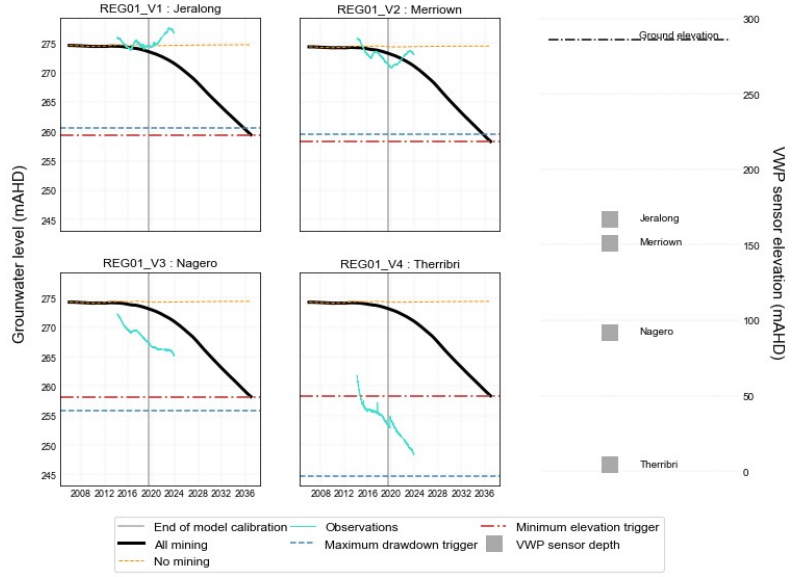


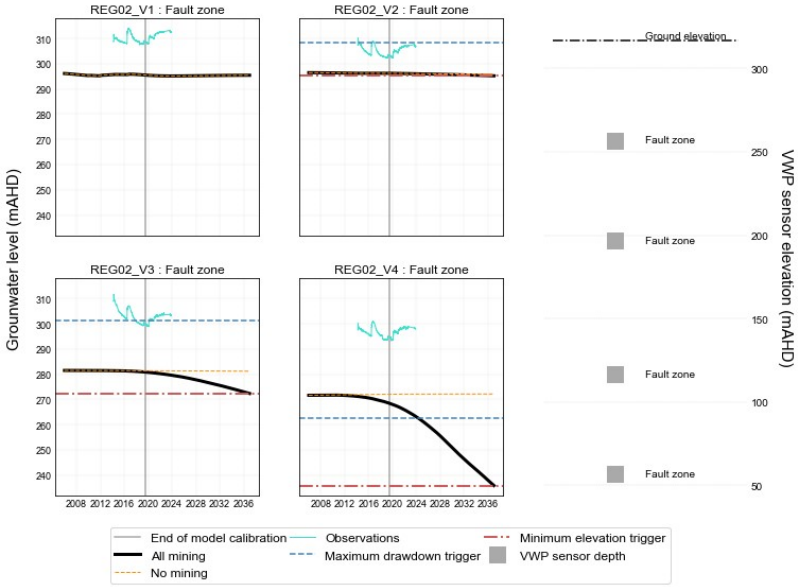
Shaded areas represent values between the 5th and 95th percentile of the baseline dataset

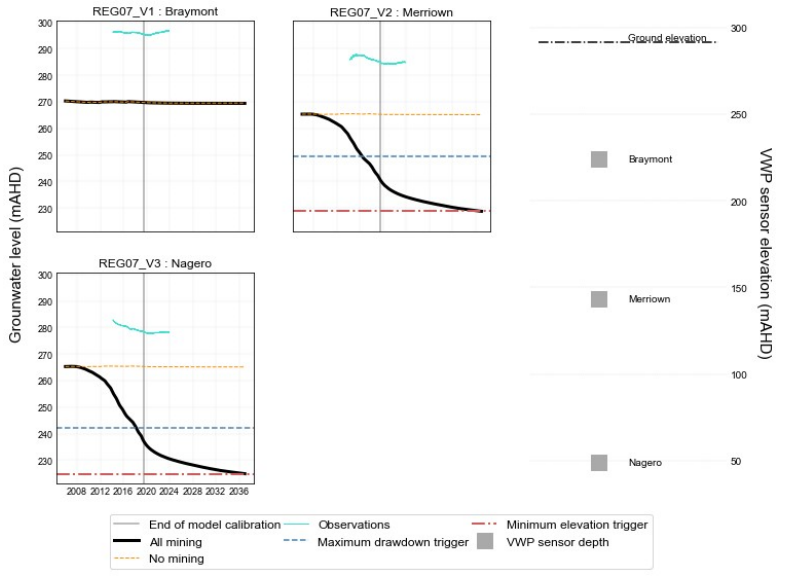
Figure E-2

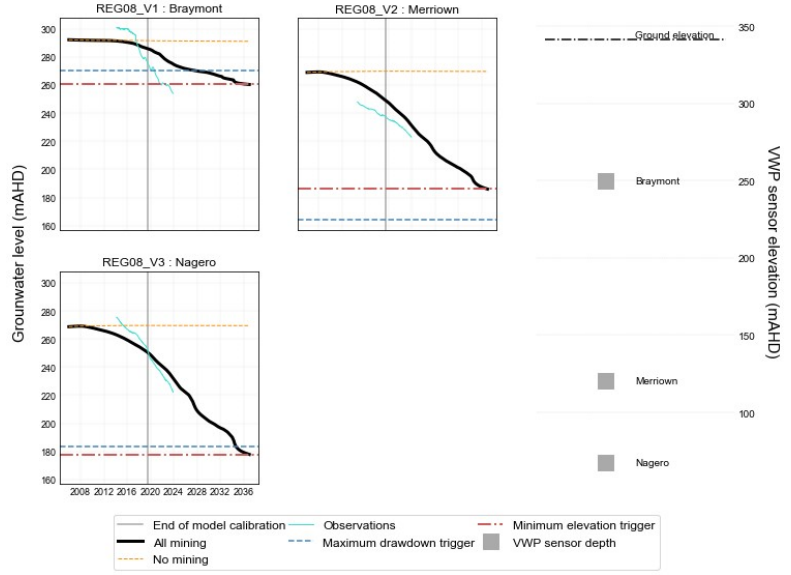
VWP Observed and Simulated Water Levels

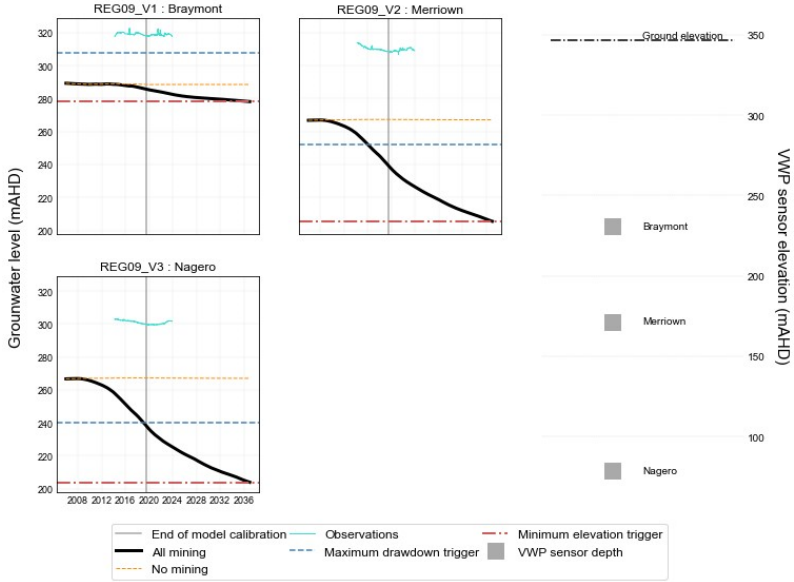


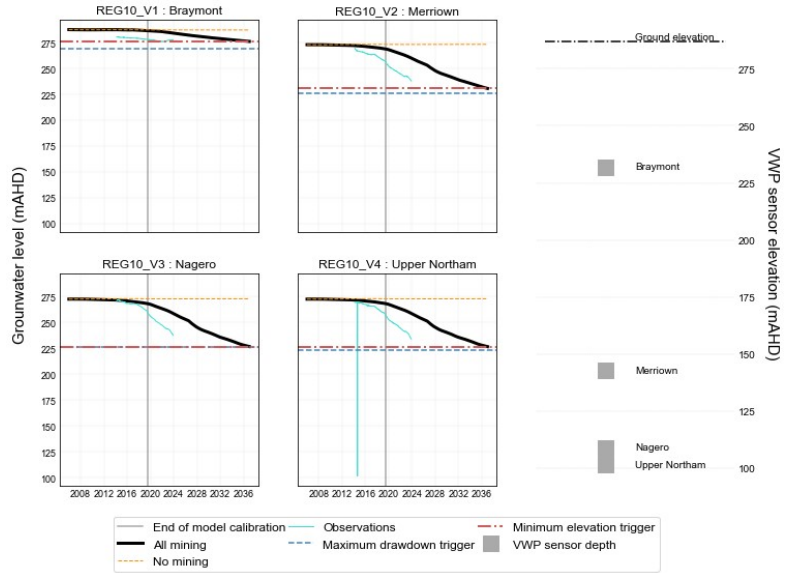

REG01_V1 : Jeralong
REG01_V2 : Merriown
REG01_V3 : Nagero
REG01_V4 : Therribri
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Jeralong
Merriown
Nagero
Therribri
End of model calibration
Observations
Minimum elevation trigger
All mining
Maximum drawdown trigger
VWP sensor depth
No mining

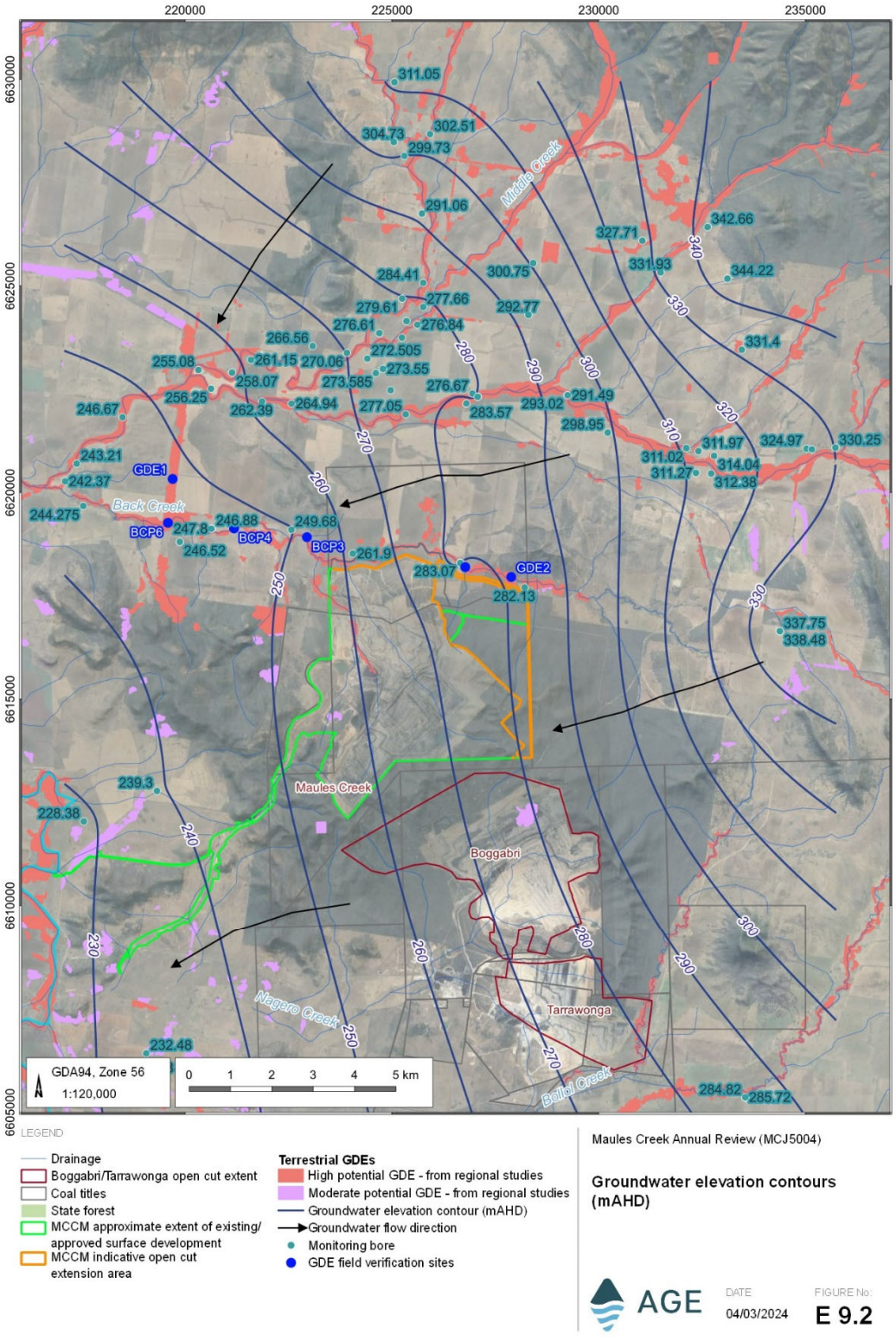

REG02_V1 : Fault zone
REG02_V2 : Fault zone
REG02_V3 : Fault zone
REG02_V4 : Fault zone
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Fault zone
End of model calibration
Observations
Minimum elevation trigger
All mining
Maximum drawdown trigger
VWP sensor depth
No mining


REG07_V1 : Braymont
REG07_V2 : Merriown
REG07_V3 : Nagero
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Braymont
Merriown
Nagero
End of model calibration
Observations
Minimum elevation trigger
All mining
Maximum drawdown trigger
VWP sensor depth
No mining


REG08_V1 : Braymont
REG08_V2 : Merriown
REG08_V3 : Nagero
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Braymont
Merriown
Nagero
End of model calibration
All mining
No mining
Observations
Maximum drawdown trigger
Minimum elevation trigger
VWP sensor depth


REG09_V1 : Braymont
REG09_V2 : Merriown
REG09_V3 : Nagero
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Braymont
Merriown
Nagero
End of model calibration
All mining
No mining
Observations
Maximum drawdown trigger
Minimum elevation trigger
VWP sensor depth


REG10_V1 : Braymont
REG10_V2 : Merriown
REG10_V3 : Nagero
REG10_V4 : Upper Northam
Grounwater level (mAHD)
VWP sensor elevation (mAHD)
Ground elevation
Braymont
Merriown
Nagero
Upper Northam
End of model calibration
All mining
No mining
Observations
Maximum drawdown trigger
Minimum elevation trigger
VWP sensor depth



APPENDIX F

Attended Noise Monitoring

LAeq, 15minute and 1minute Generated by MCCM Against Operational Night Noise Criteria

Table F-1 – January Noise Monitoring

Location	Start Date and Time	Wind		Stability Class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	18/01/2023 22:30	0.4	0	E	No	35	45	IA	IA		Nil
NM2	18/01/2023 23:30	0.4	92	F	No	39	45	IA	IA		Nil
NM3	18/01/2023 23:26	0.3	0	F	No	35	45	IA	IA		Nil
NM4	18/01/2023 23:00	0.4	88	F	No	35	45	IA	IA		Nil
NM5	18/01/2023 22:00	0.4	0	F	No	35	45	<25	25		Nil
NM6	18/01/2023 23:59	0.4	84	F	No	35	45	IA	IA		Nil

Table F-2 - February Noise Monitoring

Location	Start Date and Time	Wind		Stability Class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	1/02/2023 23:00	0.2	192	F	No	35	45	22	25	Nil	Nil
NM2	2/02/2023 00:00	0.2	134	F	No	39	45	29	35	Nil	Nil
NM3	2/02/2023 00:35	0.2	208	F	No	35	45	IA	IA	Nil	Nil
NM4	1/02/2023 23:30	0.3	200	F	No	35	45	23	25	Nil	Nil
NM5	1/02/2023 22:30	0.1	130	F	No	35	45	25	29	Nil	Nil
NM6	1/02/2023 23:42	0.1	109	F	No	35	45	IA	IA	Nil	Nil

Table F-3 - March Noise Monitoring

Location	Start Date and Time	Wind		Stability Class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	9/03/2023 22:30	0.5	24	F	No	35	45	22	35	Nil	Nil
NM2	9/03/2023 23:30	0.2	0	F	No	39	45	26	30	Nil	Nil
NM3	9/03/2023 23:36	0.3	0	F	No	35	45	IA	IA	Nil	Nil
NM4	9/03/2023 23:00	0.7	17	F	No	35	45	25	28	Nil	Nil
NM5	9/03/2023 22:00	1.6	16	F	No	35	45	IA	IA	Nil	Nil
NM6	9/03/2023 23:56	0.2	0	F	No	35	45	<20	<20	Nil	Nil

Table F-4 - April Noise Monitoring

Location	Start Date and Time	Wind		Stability Class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	27/04/2023 22:30	0.4	251	F	No	35	45	IA	IA	Nil	Nil
NM2	27/04/2023 23:30	0.2	200	F	No	39	45	<20	<20	Nil	Nil
NM3	27/04/2023 23:23	0.5	224	F	No	35	45	<20	<20	Nil	Nil
NM4	27/04/2023 23:00	0.2	122	F	No	35	45	IA	IA	Nil	Nil
NM5	27/04/2023 22:04	0.8	281	F	No	35	45	IA	IA	Nil	Nil
NM6	27/04/2023 23:55	0.5	104	F	No	35	45	IA	IA	Nil	Nil

Table F-5 - May Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	11/05/2023 22:30	0.6	121	F	No	35	45	<20	<20	Nil	Nil
NM2	11/05/2023 23:30	1.0	218	F	No	39	45	IA	IA	Nil	Nil
NM3	12/05/2023 0:22	1.5	170	D	No	35	45	IA	IA	Nil	Nil
NM4	11/05/2023 23:00	0.5	178	F	No	35	45	NM	NM	Nil	Nil
NM5	11/05/2023 22:00	0.6	242	F	No	35	45	IA	IA	Nil	Nil
NM6	11/05/2023 23:55	1.1	197	F	No	35	45	IA	IA	Nil	Nil

Table F-6 - June Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	7/06/2023 22:30	0.4	128	F	No	35	45	IA	IA	Nil	Nil
NM2	7/06/2023 23:30	0.3	300	F	No	39	45	IA	IA	Nil	Nil
NM3	7/06/2023 23:22	0.3	306	F	No	35	45	IA	IA	Nil	Nil
NM4	7/06/2023 23:00	0.4	197	F	No	35	45	IA	IA	Nil	Nil
NM5	7/06/2023 22:00	0.6	136	F	No	35	45	IA	IA	Nil	Nil
NM6	7/06/2023 23:54	0.8	243	F	No	35	45	IA	IA	Nil	Nil

Table F-7 - July Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	5/07/2023 22:30	0.4	45	F	No	35	45	<20	<20	Nil	Nil
NM2	5/07/2023 23:30	0.3	148	F	No	39	45	IA	IA	Nil	Nil
NM3	6/07/2023 00:23	0.2	39	F	No	35	45	IA	IA	Nil	Nil
NM4	5/07/2023 23:02	1.2	223	F	No	35	45	IA	IA	Nil	Nil
NM5	5/07/2023 22:00	0.1	278	F	No	35	45	IA	IA	Nil	Nil
NM6	5/07/2023 23:58	0.3	84	F	No	35	45	IA	IA	Nil	Nil

Table F-8 - August Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	3/08/2023 22:30	0.4	357	F	No	35	45	IA	IA	Nil	Nil
NM2	3/08/2023 23:30	0.3	190	F	No	39	45	<20	<20	Nil	Nil
NM3	4/08/2023 00:21	0.6	35	F	No	35	45	<20	<20	Nil	Nil
NM4	3/08/2023 23:00	0.5	302	F	No	35	45	IA	IA	Nil	Nil
NM5	3/08/2023 22:00	0.4	63	F	No	35	45	IA	IA	Nil	Nil
NM6	3/08/2023 23:55	0.3	87	F	No	35	45	IA	IA	Nil	Nil

Table F-9 - September Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	18/09/2023 22:31	0.4	76	F	No	35	45	IA	IA	Nil	Nil
NM2	18/09/2023 23:30	0.2	160	F	No	39	45	IA	IA	Nil	Nil
NM3	18/09/2023 23:53	0.2	162	F	No	35	45	<25	<25	Nil	Nil
NM4	18/09/2023 23:00	0.4	94	F	No	35	45	IA	IA	Nil	Nil
NM5	18/09/2023 22:00	0.2	149	F	No	35	45	IA	IA	Nil	Nil
NM6	18/09/2023 23:55	0.2	81	F	No	35	45	IA	IA	Nil	Nil

Table F-10 - October Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	18/10/2023 22:30	3.3	144	D	Yes	40	50	IA	IA	Nil	Nil
NM2	18/10/2023 23:30	3.3	130	D	Yes	44	50	<20	25	Nil	Nil
NM3	19/10/2023 00:19	2.8	114	D	No	35	45	<25	27	Nil	Nil
NM4	18/10/2023 23:00	1.6	132	F	No	35	45	<20	<20	Nil	Nil
NM5	18/10/2023 22:00	3.9	144	D	Yes	40	50	IA	IA	Nil	Nil
NM6	18/10/2023 23:55	3.2	130	D	Yes	40	50	IA	IA	Nil	Nil

Table F-11 - November Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	8/11/2023 22:30	3.1	88	D	Yes	40	50	IA	IA	Nil	Nil
NM2	8/11/2023 23:30	4.1	71	D	Yes	44	50	IA	IA	Nil	Nil
NM3	9/11/2023 00:20	3.4	62	D	Yes	40	50	IA	IA	Nil	Nil
NM4	8/11/2023 23:00	3.4	77	D	Yes	40	50	IA	IA	Nil	Nil
NM5	8/11/2023 22:00	0.4	92	F	No	35	45	IA	IA	Nil	Nil
NM6	8/11/2023 23:55	3.7	67	D	Yes	40	50	NM	NM	Nil	Nil

Table F-12 - December Noise Monitoring

Location	Start date and Time	Wind		Stability class	Very enhancing? [1]	Limits, dB [1]		Site levels, dB [2]		Exceedances, dB	
		Speed m/s	Direction [3]			$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}	$L_{Aeq,15minute}$	L_{Amax}
NM1	11/12/2023 22:30	1.2	15	F	No	35	45	IA	IA	Nil	Nil
NM2	11/12/2023 23:30	0.6	165	F	No	39	45	IA	IA	Nil	Nil
NM3	12/12/2023 00:20	1.2	209	F	No	35	45	IA	IA	Nil	Nil
NM4	11/12/2023 23:00	0.6	284	F	No	35	45	<20	<20	Nil	Nil
NM5	11/12/2023 22:00	0.2	0	F	No	35	45	IA	IA	Nil	Nil
NM6	11/12/2023 23:55	1.3	194	F	No	35	45	IA	IA	Nil	Nil

Notes:

1. Site-only LAeq,15minute attributed to MCCP, including modifying factors if applicable.

2. Indicates the application of a 2dB low frequency modifying factor. IA/NM – Inaudible NM – Not measurable

3. Noise limits are adjusted by +5 dB during 'very enhancing meteorological conditions' in accordance with the NPfI.

4. Degrees magnetic north, "-" indicates calm conditions